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ABSTRACT

This volume explores the development, present status, and future growth of educational research and development in the United States and documents U.S. educational research efforts as a guide for OECD member nations. Topics include (1) the organization of and issues in education in the United States, (2) the history of educational research, (3) the sponsorship of educational research, (4) the practitioners of educational research, and (5) the management of educational research and development. Educational policy implications and impacts are also reviewed. (RA)

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Educational Research and Development in the United States

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FOREWORD

In the summer of 1967 the secretariat of the Organization for Economic Cooperation and Development (OECD) issued a 701-page report on American science policy.[1] This present volume explores the development, the present status, and possible lines of future growth of one branch of science in the United States, educational research and development. Only one brief reference is made to this branch in the above referenced OECD report.[2]

The development of the present study was undertaken in response to a formal request of the Committee on Scientific and Technical Personnel (CSTP) of OECD to review American educational research and development at their November, 1969, meeting.

The genesis of the request from OECD and the basis for the agreement of the United States to undertake such a review rest on a number of factors. First, the Committee on Scientific and Technical Personnel has developed a strong interest in exploring and stimulating ways in which member nations can improve their educational systems in directions which will better enable them to fulfill the manpower and social requirements associated with economic growth and development. Increasingly, the committee's attention has been drawn to the possibilities growing out of research and development in education. The logic, indeed, seems compelling that the improvement of education ultimately rests on knowledge about learning and instruction and, furthermore, is most immediately tied to the invention of improved practices and processes resting squarely on that accumulating knowledge base.

Second, CSTP and the secretariat of OECD have for some time been aware of the increasing attention being paid in the United States to educational research and development. The resources available for such activities, particularly in the past three or four years, appear large both proportionately and in absolute terms. The United States appeared to be undergoing a rapidly evolving experience which might profitably be studied by other nations. An exploration of the American experience might well permit other nations to leapfrog over difficulties or issues that had been encountered in the development of American programs. It can serve to highlight issues in need of resolution which may not yet have emerged in other national experiences. Furthermore, an exposition of the American experience will provide an opportunity for comment and analysis which can only prove beneficial to the United States' programs.

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[1] Review of National Science Policies: United States. Paris: Organization for Economic Cooperation and Development, 1967.

[2] *Ibid*., p. 278.

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Third, American officials responsible for the management of the research and development programs administered by the United States Office of Education (USOE) perceived the need and the potentialities that would come forth from such a review. A study of American educational research and development could stimulate a better understanding of the scope of activities currently being supported in educational research and development and related areas, the kinds of problems and issues being encountered, and the relationship of the full range of activities to critical policy issues in both research and education.

More specifically USOE and OECD officials agreed that the purposes of the review would be:

1. To offer an opportunity for the member nations of OECD to examine in some detail the experience of the United States in educational research and development. (The examination would be based primarily on available data to be supplemented by one or two special studies commissioned by the Office of Education to provide additional data for several parts of the report.)

2. To help United States officials acquire a better, more explicit understanding of the scope of the educational research and development activities in the United States.

3. To stimulate United States officials to analyze and refine the data base and conceptualizations regarding the activities for which they are responsible.

4. To help the Office of Education research program, the largest single component of the total education R&D effort in the United States, to move in directions of greater sophistication, value, and impact.

The first formal step leading to the review was the drafting of a preliminary paper[3] which was presented to the Committee on Scientific and Technical Personnel at its October, 1967, meeting. The paper sketched out a conceptualization of educational research and its management, presented a brief discussion of the emergent strategies of USOE research, and concluded with a speculative discussion of the potential impact of current research and development on future educational policy.

The paper aroused considerable interest and was the focus for lively discussion at the meeting. The decision to undertake a full-scale review of educational research in the United States was arrived at during the months immediately ensuing the October meeting in Paris.

The procedures devised for the review are emblematic of the composite character of the subject under study.

In its science policy reviews OECD has utilized the talents of consultants and its own secretariat to develop the background document for the reviews of national science policy. In examining national education systems, however, the member nations themselves have been responsible for the development of the written materials.

In the case of this particular review it was determined, primarily because of the decision that several of the principal purposes of the examination were to strengthen the United States' administration of its educational research program, that responsibility for development of the background document should rest with the agency identified as having the largest group of activities in the area under consideration. The Bureau of Research, USOE, therefore, was charged with responsibility for preparing this background document. The development of the outline for the study and its performance by the Director of Planning and Evaluation of the Bureau of Research were closely coordinated with the Research Advisory Council of the USOE which acted as a review board. Other Federal agencies whose activities comprised part of the descriptive or analytical material were offered an opportunity to review the report for accuracy before transmission to OECD. In adopting this procedure, responsibility for production of the document clearly rested in one place, but the study which emerged was carefully coordinated with other responsible bodies and we believe accurately reflects the fullest range of activities and thinking possible.

June 27, 1969
Washington, D.C.

Hendrik D. Gideonse, Director
Program Planning and Evaluation, Bureau of Research
United States Office of Education

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[3] R. Louis Bright and Hendrik D. Gideonse, Education Research and its Relation to Policy: An Analysis Based on the Experience of the United States, ERIC Document ED 018 866.

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PREFACE

Educational research in the United States is going through a period of agitation, ferment, perhaps even crisis. For the third year its funding level, whether measured by United States Office of Education or National Science Foundation or other Federal agencies' appropriations, has remained virtually level. This has happened despite the fact that, just prior to the beginning of the three-year period in question, a call was issued for a dramatic expansion of support and the establishment of a group of new institutions to carry out newly specified and, by previous standards, quite costly research and development functions and responsibilities.

Perhaps no better indication of the present excitement can be found than in the discovery that in the past twenty months no less than ten studies have been or are being conducted on educational research and development. The first - and quite modest one - was done by the Bureau of Research in August, 1967,in response to a special request of the Bureau of the Budget.

The Office of Program Planning of the Department of Health, Education, and Welfare, again at the request of the Bureau of the Budget, conducted a study of the Bureau of Research and issued (October, 1968) an internal report on their findings and recommendations. President Johnson's Science Adviser, Donald Hornig, established a special panel under the auspices of the President's Science Advisory Council to survey the field of educational research and development to determine what kind of contribution they might be able to make to its general advance. The USOE Office of Program Planning and Evaluation has been studying the programs of the Bureau of Research aiming toward the issuance of a report in the summer of 1969. And finally, the Bureau of Research was charged with the responsibility for preparing this report.

Nongovernmental study efforts have included that of the Committee for Economic Development which issued its report Innovation in Education: New Directions for the American School in July, 1968. The Carnegie and Ford Foundations have supported a study of research and development in the education products industries. The American Educational Research Association, a professional membership group, is currently engaged in a study of research and communication processes. Finally, the National Academy of Education, a small, highly select, and influential group organized to "promote scholarly inquiry and discussion concerning the ends and means of education, in all its forms, in the United States and abroad" has just published a report, Research for Tomorrow's Schools: Disciplined Inquiry for Education, presenting the results of extended deliberations by its Committee on Educational Research.

All of the above studies have been made available to the drafters of this document. But it is their very number, the diversity of the agencies and institutions responsible for their development, and the varying breadth of scope and interest which is most provocative. The flurry of analytical activity suggests a very broad level of concern from inside and out, within the direct administration of program and from centers of more reflective review of science policy, and from the academic arena as well as business and industry.

That there have been so many studies of educational research and development suggests an aura of adolescent self-consciousness. But it may also herald an imminent takeoff of new levels of support and greater degrees of impact on the educational system of the Nation.

This study is drafted from the very middle of the surge and flow. In preparing it we have tried to present a moving picture rather than a snapshot; to convey an impression of flux, excitement, danger, and possibility.

The chapters which follow present a view of educational research and development that relates to the operational problems of the educational system as well as the hopes that the United States expects its educational system to fulfill. It views educational research and development in very broad terms. That breadth of view stems from an expansive view of educational research. But it also grows out of a conviction that educational research should be viewed as a special subset of science policy in the broader sense. The questions now confronting educational research and its relationship to the educational systems of the Nation are analogous to those confronting science policy experts who examine the ways in which science serves national policies, goals, and hopes.

To see educational research in this light may be an ambitious undertaking, but we think it would be well to permit examination both on the degree to which such an attempt is useful and worthwhile, and the degree to which we have accomplished the objective we set for ourselves.

Finally, we think that it may be of special interest to the OECD member nations that this review represents an instance of the combination of two types of policy inquiry which have long been of concern to them. Educational policy and science policy are distinct fields. Of course, in one respect or another it would be natural to expect some overlap here and there between the two. An exploration of educational research and

and development, however, provides a unique and fascinating bridge between the two kinds of policy concerns. Here, then, is a study of an area of science oriented by mission toward education, a newly expanded field of endeavor with a not inconsiderable history, and one with dramatic promise for the future.

GLOSSARY

AERA - American Educational Research Association

AFT - American Federation of Teachers

AIR - American Institutes for Research

BRICS - Bureau of Research Information Control System

BSCS - Biological Sciences Curriculum Study

CAI - Computer Assisted Instruction

CED - Committee for Economic Development

CHEM - Chemical Education Materials Study

CMI - Computer Managed Instruction

COBRE - Committee on Basic Research in Education

DDC - Defense Documentation Center

DOD - Department of Defense

EDRS - ERIC Document Reproduction Service

EEOS - Equal Educational Opportunity Survey

ERIC - Educational Resources Information Center

ETS - Educational Testing Service

ETV - Educational Television

GPO - Government Printing Office

HEW - Department of Health, Education, and Welfare

HCY - Handicapped Children and Youth

IDEA - Institute for the Development of Educational Activities

IED - Institute for Educational Development

IMC - Instructional Materials Centers

IPI - Individually Prescribed Instruction

ITV - Instructional Television

NAE - National Academy of Education

NAS - National Academy of Sciences

NCES - National Center for Educational Statistics

NEA - National Education Association

NICHD - National Institute of Child Health and Human Development

NIMH - National Institute of Mental Health

NLECE - National Laboratory for Early Childhood Education

NSF - National Science Foundation

OCA - Office of Computing Activities

OEO - Office of Economic Opportunity

OPPE - Office of Program Planning and Evaluation, USOE

PSAC - President's Science Advisory Committee

PSSC - Physical Sciences Study Committee

RIE - Research in Education

SIE - Science Information Exchange

SMSA - Standard Metropolitan Statistical Areas

SREB - Southern Regional Education Board

USOE - United States Office of Education

WICHE - Western Interstate Commission on Higher Education

Chapter I

RESEARCH AND DEVELOPMENT FOR EDUCATION

Analyses of research and development in any field draw upon a considerable body of knowledge and discussion. Research and development for education is no exception.

Some of the literature about research and development is abstract and generalized. Some of it is concrete and particularized. But in all cases models of research and development are either implied or explicated for they provide an important sense of structure to the discussion.

For analyses of this kind, education cannot be considered a discipline. Rather, it is an arena for the interaction of diverse social and political forces and a problem area which can lend focus for study, inquiry, and improvement. Almost by definition, then, the characterizations and models of educational research and development are peculiarly linked to the missions and functions that education itself is called upon to perform for individuals and society. For the purpose of this study, therefore, educational research and development includes those activities which are initiated within the findings and methodology of the social, behavioral, and information sciences or are based squarely on them, and which either are oriented or can be viewed as oriented toward the improvement of education and instruction.

Research

The objective of research activities is to discover, reinforce, or refine knowledge. Research is carried out because we want to know something, because we want to devise better conceptual models for describing interrelationships among variables, or because we want to establish the direction and nature of so-called "cause-and-effect" interactions.

There are many different purposes for wanting to acquire, amplify, or otherwise secure knowledge. It is these many purposes which give rise to discussions about basic and applied research or conclusion-oriented as contrasted to decision-oriented inquiry. Similarly, questions arise whether evaluation studies or continuous and systematic data collection activities are to be considered part of the research domain.[1]

Inasmuch as these distinctions ultimately enter into policy deliberations about research in education, it is important to present the varying definitions and positions and to explicate as clearly as possible which, if any, have been adopted for the purposes of this particular policy review.

The National Science Foundation defines basic research as being "primarily motivated by the desire to pursue knowledge for its own sake. Such work is free from the need to meet immediate objectives and is undertaken to increase understanding of natural laws."[2] Applied research, according to the Foundation, "is carried out with practical applications in mind and may either be concerned with translating existing knowledge into such applications or creating new knowledge for this purpose. It differs from basic research in that it seeks to show or indicate the means by which a recognized need may be met."[3]

Professor John B. Carroll distinguishes between basic and applied research in education by reference to whether or not it is more immediately addressed to "the better understanding of phenomena or the achievement of a specific practical goal."[4] He further distinguishes between them by noting that, in the behavioral sciences, basic research tends to concern itself with molecular levels of behavior, applied research with molar. "For example, basic research in learning is concerned with the precise combinations of stimulus and response variables that produce certain effects, whereas applied research might be concerned with the effects, say, of massive doses of positive reward, which for certain groups of school learners might _on the average_ produce significantly beneficial effects. The applied researcher would not necessarily worry about why positive reward works, or why it does not always work for all students, whereas the basic research scientist -- if he is worth his salt -- will push for understanding of the total dynamics of the phenomena he is studying."[5]

A just-published report of the National Academy of Education proposes a different kind of distinction, that between conclusion-oriented and decision-oriented inquiry. According to the definitions developed there, conclusion-oriented inquiry takes its direction from the investigator's commitments and hunches. The conclusion-oriented investigator is free to reframe his questions as he goes along, taking advantage of each partial insight to redirect his inquiry.

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[1] See, for example, the discussion by Egon Guba in "Significant Differences," _Educational Researcher_, Vol. XX, No. 3, 1969.

[2] _Federal Funds for Research, Development, and Other Scientific Activities_, Volume XVI. p. 11.

[3] _Ibid._, p. 15.

[4] John B. Carroll, "Basic and Applied Research in Education." _Harvard Educational Review_, Volume 38, No. 2, p. 268.

[5] _Ibid._, p. 271.

Decision-oriented inquiry, on the other hand, is designed to provide information to a decision-maker. The decision-oriented researcher, is thus not free to redirect his inquiry as he sees fit; his activities are defined in terms of the decision-maker's requirements.[6]

Finally, one additional view questions whether the distinction between basic and applied is meaningful at all. Michael D. Reagan writes that the evidence he has seen leads him to the conclusion that we would be on firmer ground if we operated in terms of the much more critical distinction between research and development. He arrives at this view because of the many differing bases he has uncovered for distinguishing between basic and applied research and the difficulty he finds of convincing one audience of the usefulness of the terminology of another's.[7]

Much of the concern for distinctions between different kinds or conceptions of research grows directly out of the particular perspectives of the discussants. Scientists, for example, will generally develop quite strong statements in basic, molecular, or conclusion-oriented directions. Sponsors of research, particularly those who operate within the context of one or another mission (such as education), can be depended upon to pay particular attention to application, to molar, or to decision-oriented kinds of activities. Finally, educators in schools and colleges, while attending to many of the same kinds of concerns as research and development sponsors, may also call for kinds of research or data-collection which many scientists might consider to be more closely related to record-keeping than to research.

In the management of research all of these viewpoints need attention. Each of these several requirements needs to be examined and weighed in the light of available resources, particular agency or institutional responsibilities, and the relationship of each activity to the broader mission of the improvement of education. In other words, in defining research for education we have opted in the direction of expansiveness rather than limitation. We thus leave it to the policy-makers, once the full range of potential activities has been identified, to make the decisions as to amount and kind of research to support and what should be the sources of support.

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[6] Lee J. Cronbach and Patrick Suppes, editors, Research for Tomorrow's Schools: Disciplined Inquiry for Education. New York: The Macmillan Company, 1969, pp. 20-21.

[7] Michael D. Reagan, "Basic and Applied Research: A Meaningful Distinction?" Science, Volume 155, March 17, 1967, pp. 1383-1386.

Several approaches to the substantive description of research activities in education are possible. For example, one of these might be in terms of the academic disciplines which have bearing on education or on the basis of which education could be directly studied. Another quite different approach would be to develop some idea of the kinds of problems which together constitute the field of education and discuss examples of research possibilities from that perspective. A combined approach makes it possible to take full advantage of both perspectives. The examples of educational research presented below are merely illustrative. They are offered only to give scope and concreteness to the definition developed above.

The discipline of psychology is basic to educational research. Studies of retention, reinforcement, stimulus discrimination, the development of perceptual abilities, and of cognitive, affective, and conceptual processess are all central to the study of learning. Because of the importance of studies of animal learning to the development of theory, they are included as part of the broader fields of study to which the educational R&D policy maker must attend.

Sociology also provides a critical discipline from which to launch studies of relevance to education. It deals with behaviors at a level of complexity that tend, to use Carroll's distinction, more to the molar than the molecular. Studies of the interaction between non-school variables and student achievement, the school and classroom as social systems, the change process in education, and the relationship of the educational system to social and political goals constitute examples of areas which can be profitably explored from the discipline of sociology.

The sense of perspective that the history of education can lend to present-day decision-makers provides at least one example of an area of research essentially conclusion-oriented in its performance but which, upon completion, is often of immediate even if indirect usefulness to the decision-maker. The vantage points of political science for studying the organization of power in our educational systems and institutions are invaluable. Philosophy can contribute not only to the clarification and refinement of the language we use to discuss education and learning but also to the aesthetic and ethical issues that educators encounter in carrying out their responsibilities. Economics appears to present an increasingly more attractive framework for analytical studies, not necessarily exclusively oriented toward finance.

A long-range perspective suggests that other disciplines may also contribute to education. Work now under way on chemical, biological, and neurological studies of learning has provocative implications. In a completely different vein, the information sciences are providing exciting technological applications for instruction, and also extremely interesting work in the modeling of learning mechanisms.

A second way of viewing research for education is in terms of the problems and issues internal to education. For example, the effects of racial factors or socio-economic characteristics on educational achievement provide a key focus for research activities. Grouped in this manner, psychologically or sociologically based studies may both be seen as relevant, but so might economic or historical studies.

The study and analysis of instruction provides an important focus for research in education. Sequencing of materials, the relationship of motivational factors, the analysis of teacher role, and the effects of peer influences on learning and achievement are illustrative of studies which might be done in this area.

Evaluation studies in education assume increasing importance as attention to school output and performance increases. Careful attention to evaluation design and the collection of data on relevant input variables can enable administrators and teachers in educational institutions to ask for and get correlations between inputs and outputs in school settings. This approach may reveal important clues for new policy hypotheses or identify programs whose performance is or is not justifying the resource investments being made. Evaluation is often not considered a research function; this judgment is often accurate in the light of some past performances. The developing understanding of evaluation as a form of policy research, however, places these studies very much within the purview of the research administrator's responsibilities.

Other foci for educational research include long-range futures studies, the organization of educational systems, or any number of educational or social problems. Each focus suggests a variety of research activities or approaches; each constitutes a somewhat different way of stimulating thought on the types of research activities that might be relevant to education.

Development

The objective of development activities carried out in the field of education is to produce materials, techniques, processes, hardware, and organizational formats for instruction. The basis for such development is our knowledge about learning, motivation, instruction, and education. The materials and techniques developed are designed to accomplish certain objectives, specified in advance, which are construed to be part of the broader goals of instruction or education. In other words, when a development activity is initiated the objectives, cast in something approaching a performance specification, are known or established at the outset. This clearly distinguishes development from research activities, whose objective is to discover an outcome which may be suspected but is not known.[8] Unlike research, development as a process cannot be described in terms of any academic discipline. Our knowledge about human learning, motivation, instructional sequencing, teacher role, environmental and peer influences, and the like, however, provides the conceptual foundation for educational development.

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[8] The editors of Research for Tomorrow's Schools: Disciplined Inquiry for Education, op. cit., include development as an aspect of decision-oriented inquiry. They do not identify it separately as this report does. While the distinction between conclusion- and decision-oriented

Like research, however, there are several ways of presenting structures within which development possibilities can be illustrated. Age-grade level is one such structure. Academic disciplines as subject matter provide another. Categories like instructional systems, teacher role, organizational structure, and school management constitute another analytical dimension.

Examples of development in education include the construction of programmed instructional materials, the building of curriculum units, the designing of computer-assisted and computer-managed instruction, and the validation of teacher centered instructional techniques based on our knowledge of teacher-pupil interactions. Careful development of television programming, the construction and validation (as to learning effect) of single concept films, and the development of new organizational forms for schools and universities are further examples.

Dissemination

The third major activity associated with research and development for education is dissemination. It avails little if the newly produced knowledge is not made available in suitable forms for other researchers, developers, or practitioners. It makes little sense if new products and processes are carefully designed, developed, and tested and educational professionals are not made aware of their availability. New things, whether knowledge or practical products, must be "advertised"; information about them must be made available to those in the field and the research community. It is this key function of making information about research and development available in usable and effective forms to which the term dissemination is applied.

Dissemination can have passive as well as active forms. It may be important to have repositories of information that can be tapped, as well as to have agencies, programs, or activities designed to carry diverse messages derived from research and development activities to a variety of audiences.

Dissemination ought not to be confused with its several techniques (e.g., data banks, brochures, articles, monographs, films, games for policy-makers, demonstrations, etc.). It also should not be confused with the sociological concept of diffusion. Diffusion refers to the entire process by which innovations are spread throughout a culture, a society, a profession, or some other extended social system. Dissemination mechanisms may be a key factor in the diffusion process, but so might the active support of rigorous

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inquiry appears particularly useful in the research domain, development appears to be more appropriately identified as a distinct type of activity in its own right.

development or the provision of adequate support for research.

Examples of dissemination activities have been suggested above, but they could profit from further amplification. Perhaps the most elaborate example in the United States of a data bank as a dissemination device is the Educational Resources Information Center (ERIC). This system collects, abstracts, and places into microfiche form current significant reports, studies, and documents relevant to education. Abstracts are indexed and it is possible to retrieve materials from the system on the basis of the index terms used. ERIC publishes a monthly bulletin, Research In Education, which identifies work in progress and recent acquisitions.

Dissemination can also take more active forms. Specific findings or syntheses of work completed over a period of time can be prepared and packaged in forms suitable for particular audiences. The "messages" which are developed may appear in a variety of forms including conversation, print, film, tape, slides, or any combination thereof. A more familiar form of dissemination device is the demonstration, an instance of a particular innovation in operation. Another dissemination device might be a game or simulation for policy-makers. The difficulties of communicating through print and the power of role-playing as a motivational device for learning suggest the utility of building games which incorporate into their rules and player roles the kinds of structures and interrelationships which research has uncovered. The findings are "disseminated" through the learning and playing of the game itself.

Still another approach is the knowledge derivation and application conference or workshop where problems are discussed and refined by educators and policy-makers and then related by experts present at the sessions to specific knowledge or data sources that might be tapped. These few examples do not exhaust the full range of dissemination mechanisms, but they do suggest the possibilities which exist here.

Models of the Relationships Among Functions

Owing perhaps to the relative infancy of significant financial support for educational research and development, there is not a great deal of literature on the relationship of research to development, or development to research, or the relationship of both to the improvement of education.

The models which do exist tend to fall into three principal categories. The first category tends to view the goal of educational improvement as being dependent upon adequate diffusion mechanisms which in turn require the invention and development of tested innovations to diffuse, which in turn depend upon the adequacy of the research base. Such models as these can be called linear or dependency models.

The most representative and well-known[9] example of this type of model is that developed by Egon Guba and David Clark.[10] Their model was developed in connection with an attempt to classify processes related to and necessary for change in education. They constructed a schematic diagram to illustrate a theoretical continuum research into action. The first activity included in the schema was research to create new knowledge.

A second stage is development. It is seen as consisting of two types of activity, invention and design. The third major phase of activity in their schema is diffusion consisting of dissemination and demonstration. Finally, the three stages of adoption-trial, installation and institutionalization complete the theoretical continuum.

Despite the qualifications by the designers of the model, that the apparent inherent logic of the model from research to installation did not necessarily hold in real-life and that a variety of points of initiation were possible, the model is generally identified by and associated with its strong linear characteristics.

A second type of model sees essential differences and disconnections between the research, development, and dissemination functions. Models such as these draw attention to the different rules of evidence and sources and types of data input to decision-making in each function. The relationships among different types of activities within research and development are recognized, but these models tend to be more impressed by the present-day decision-making requirements than by patterns which may emerge from somewhat longer-term historical analysis of change or from the apparent logical dependence of one function on another.

The most recent example of this kind of model is that developed by Hendrik Gideonse.[11] It separates the three primary functions of research, development, and school operations in terms of the different outputs expected of each. The model is constructed to illustrate the interdependence of all the functions on one another but also to underscore the possibilities existing in each function for independent initiatives based on different decision rules.

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[9] Well-known, that is, in the United States. In addition, it should be said that its representatives in this category are more de facto than de jure. In presenting the model caveats were offered which have long since been forgotten by those who now refer to the model as an illustration of a linear approach.

[10] Egon G. Guba and David L. Clark in SEC Newsletter, The Ohio State Univ., Volume 1, No. 2, October, 1965, pp. 2-5.

[11] Hendrik D. Gideonse, "Research, Development, and the Improvement of Education," Science, Volume 162, November 1, 1968, pp. 541-545.

Another publication which appears to be based on a decision-oriented model is the Thirty-Fourth Report of the House of Representatives Committee on Government Operations. In this brief document the importance of clear identification of developmental missions as a focus for research and development programs was stressed.[12] The analysis in Project Hindsight also implies such a model.[13]

A third category of research and development models for education might be designated by the term "linkage." In this kind of model the close interrelations of research, development, and dissemination are stressed. The linkages are elevated to closer scrutiny without necessarily limiting attention to the particular stages in inquiry, development, or dissemination. Models in this category may have a tendency to be performer-oriented and to stress the importance of individuals in a research-development-dissemination continuum.

This kind of model is represented by three papers. The first, by Norman Boyan and Ward Mason, speaks of the importance for research and development institutions for considering the concept of linked research and development.[14] Second, the writing of Robert Glaser stresses the importance of the interrelationships between research and development with research sometimes leading to the suggestion for the development of new techniques or processes and development often-times suggesting new types of research problems.[15] Last, the report of G. Raisbeck and others[16] points to the importance of interpersonal communications in research and development and in particular the degree to which successful development efforts are characterized by the actual presence of the conceiver of an idea from the initial execution of the research and exploratory development phases up to the stage of actual production.[17]

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[12] Federal Research and Development Programs: The Decision-making Process, House Report No. 1664. Washington: U.S. Government Printing Office, 1966.

[13] Chalmers W. Sherwin and Raymond S. Isenson, "Project Hindsight," Science, Volume 156, June 23, 1967, pp. 1571-1577.

[14] Ward S. Mason and Norman J. Boyan, "Perspectives on Education R&D Center," Journal of Research and Development in Education, Volume 1, No. 4, pp. 190-202.

[15] Robert Glaser, "Discussion: New Myths and Old Realities," Harvard Educational Review, Volume 38, No. 4, Fall, 1968, p. 746.

[16] Raisbeck, G., et. al., Management Factors Affecting Research and Exploratory Development. Cambridge, Massachusetts: Arthur D. Little, Inc., April, 1965.

Discussion

R&D models such as these provide guidance in framing the context in which work is done. They affect the decision-making process as a consequence of understanding the context in that particular way. Perhaps just as important, even the absence of a model is significant.

The kind of model that is likely to be acceptable or useful is probably closely related to the differential responsibilities of the individuals or agencies engaged in educational research and development. Thus, the linear model is likely to be used by a student of institutional change or of the larger process of the diffusion of innovation through a social system.

The decision-oriented model is likely to appear much more comfortable to a sponsor of educational research and development who stands midway between the research and development process and the educational system and is confronted by demands for immediate effects as well as long-term benefits.

The linkage model is likely to appear much more realistic to the researcher or developer. The understanding of (1) what is required to produce a research finding, to capitalize through development on earlier research, and to identify needed research through attempts to engage in development, and (2) how important it is for the researcher or developer himself to engage in dissemination activities, will tend to lead the researcher or developer to feel more comfortable with a model which stresses linkages.

Perhaps most important about the models, therefore, is that each is relevant from the particular perspective of the one who uses it and each must be in some sense compatible with or sensitive to the requirements of the others.

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[17] None of the three types of models discussed above - linear, decision-oriented, or linkage - adequately encompasses the kinds of concerns raised by Ron Havelock in his development of the notion of linkage or by Paul Ross and Charles Halbower in their formulation of the idea of the importance of initiating and sustaining mechanisms for change. Havelock, Ross, and Halbower are all focussing on research utilization of the diffusion process rather than on the research and development subsystem. In both instances the particular emphasis is on the mechanisms and conditions requisite for the utilization of knowledge derived from research. The "people change" requirement for effective research utilization in education suggests that change process models may well be of primary importance in conceptualizing educational improvement through research and development. The addition of this element to the dialog may well stimulate more sophisticated models of R&D for education as the implications of research utilization and R&D models are conjointly more fully explored. A strong contribution

Thus the problem for the policy-maker in research is to make clear what conceptions of the research and development process he holds. He must do so in a way which does not deny the validity of models of research and development that have value from other vantage points.

The model adopted for the purpose of drafting this briefing document views research, development, and dissemination as different and distinct kinds of activities. The purposes of performing and supporting each are distinct. The procedures and talents required for each, while bearing some overlap, are also unique in one aspect or another. The reasons for initiating activities in one or another sphere are sufficiently different to require different models of data collection and analysis and perhaps decision rules as well.

In short, the model of research and development utilized implicitly throughout this document is oriented strongly toward the decision-making requirements of the sponsor or administrator of research and development for education. That orientation is compatible, however, with both of the other types of models. Attention to the logic of improvement as it is manifest over time in the gradual incorporation of the knowledge accumulated through research into the operation of schools is not harmed by the decision-maker's model. And the performer-oriented notion of essential linkages between research, development, and dissemination can be accommodated if the decision-maker attends to performer requirements when he deals with the various administrative and institutional "instruments" he uses to carry out the various functions identified for support.

This chapter began by emphasizing that in the main educational research and development is mission-oriented. In other words, it is supported because practical, though not necessarily immediate, consequences are anticipated that will contribute to meeting real individual, social, political, and technological ends. Consideration of the educational system in the context of emerging national requirements, therefore, is an important prerequisite for assessing the nature and status of American educational research and development.

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in this direction albeit not in the field of education is the recent article by William J. Price and Lawrence W. Bass, "Scientific Research and the Innovative Process," Science, Volume 164, May 16, 1969, pp. 802-806.

Chapter II

EDUCATION IN THE UNITED STATES: ORGANIZATION, TRENDS, AND ISSUES

Education in the United States is a vast cooperative enterprise. Furthermore, it is generally regarded as an inalienable right which should be available to all children, regardless of the economic or social status of their families. Its organization is a unique blend of Federal, State, local, and private jurisdictions, and it embraces an almost bewildering panoply of structural variations.

The Political Organization of Elementary and Secondary Education

The Constitution of the United States makes no reference to education, but Article X confers upon the States powers in those areas which are not specifically denied to the States or reserved to the Federal Government. Power over education and legal responsibility for the maintenance of educational systems, therefore, rests in each of the fifty States. The provisions of the fundamental document of American government thus indirectly affirm the philosophy of decentralized control and regulation of education.

Since the specific enabling legislation authorizing the maintenance and support of public education and regulating the licensing of private education is different for each of the fifty States and five other jurisdictions of the United States, no standard pattern exists. There is no standardization as to which procedures or provisions are incorporated into their several constitutions, which are covered by State laws, rules and regulations, or which are administrative determination.

As a consequence of these legal and Constitutional circumstances it is proper to say that there are many systems of education in the United States. To add to the diversity, there are also private systems, some quite large and elaborate, coexisting with the extensive systems receiving public support. But all of these systems, whether public or private, operate at the local level under such policies or licensing requirements (in the case of private education) as are operative in the particular State where they are located. It should be emphasized that power over education is not inherent in local self-government. Instead, the States have provided for the establishment of local administrative districts and vested them with extensive authority and responsibility for the establishment, control, and regulation of the schools in their districts. In short, most of the States have delegated operational responsibility for elementary, secondary, and, in an increasing number of cases, post-secondary education below the baccalaureate level, to local school districts.

For nearly three-quarters of a century after the establishment of the Federal Republic, Article X served to nullify national legislative efforts to provide for any sort of Federal aid specifically for education in that part of the Nation already organized into States. After the War Between the States, national requirements gradually focussed attention on the "general Welfare" clause of the Constitution as an avenue permitting some kind of Federal involvement in the educational systems of the Nation. First the Morrill Acts and then later the vocational education legislation passed during the first World War expressed a gradually awakening national interest in the support of education.

The relationship between Federal, State and local governments pertaining to education may be described as a partnership in which each of the three levels of government, at one time or another, has participated in varying ways and degrees in the establishment and support of education. It is now generally recognized that both the quantity and quality of education are proper concerns of the Federal Government, although it is clearly understood that the administration and control of public educational institutions are the responsibility of State and local governments. The present character of this association of three levels of government for the maintenance of education is the outcome of more than three centuries of social, political, and institutional development.

The Political Organization of Higher Education

The political organization of higher education is characterized by even greater diversity of responsibility than lower education. This circumstance arises from the long tradition of private responsibility for higher education and, more recently, the unparalleled expansion of State activity in this area. The expansion of public higher education is illustrated by noting that in 1947 the number of first-time enrollees in public institutions of higher education as contrasted to private ones was 298,508 to 294,338. In 1965, the last year for which figures other than estimates exist, the ratio was 990,021 to 451,801.[1] Clearly substantial shifts are underway, if not in the organization and administration of higher education in the United States (the number of privately controlled institutions is still substantially larger than the number of publicly controlled[2]), then certainly in the impact on the society as a whole and perhaps also on deliberations affecting current policy.

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[1] Digest of Educational Statistics, 1968. Washington: U.S. Government Printing Office, 1968, p. 68, Table 82. The estimate for 1968 (1,074,000 to 422,000) indicates a further widening of the margin.

Considering the tremendous diversity in the types of institutions of higher education, their size, and their patterns of organization and control, it is difficult to refer to a "system" of higher education in America analogous to that in France, Russia, or the United Kingdom. One might better use the words of the examining team in conducting the review of higher education in the United States in relation to future demand for scientific and technological manpower.

> ...competition between many autonomous academic corporations: in the market for academic prestige and income...has produced a vast and lively untidiness of some 2000 state and private organizations of varying size, quality, geographical coverage, academic specialisation and level of education offered. In common with many European systems of education, the American universities and colleges present a hodge-podge of deceiving names. Institutes may be universities, universities may be colleges, and colleges may be institutes. There is no legal sanction of orderly nomenclature.[3]

The American college dates from the colonial era; the first college, Harvard, was established in 1636. There were nine such institutions by 1776. All but one were established by religious denominations. It should be noted that they were patterned after the independent colleges of Oxford and Cambridge, not the university as a whole either on the English or Continental model.

The period from 1780 to the War Between the States was marked by a spectacular increase in the number of colleges. During the latter part of the 19th century, influenced by the European - particularly German - universities, American colleges began to liberalize their curricula. State universities, of which there were a few early examples in the late 1700's, grew rapidly after the turn of the century and were stimulated even further as a consequence of the Morrill Act of 1862.

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[2] Ibid., p. 83, Table 104. There are obviously many small, privately controlled colleges and universities.

[3] Higher Education and the Demand for Scientific Manpower in the United States. Paris: Organization for Economic Co-operation and Development, 1963, p. 18.

Professional education, other than in theology, dates from the opening of a college of medicine in 1765 (at what is now the University of Pennsylvania) and the establishment of the first law school in 1784. The first school of technology was the United States Military Academy at West Point (1802) and the first civilian institution, Rennselaer Polytechnic Institute, was founded twenty-two years later.

Structural Patterns in American Education

The decentralized character of the political organization of both lower and higher education in the United States has contributed to the development of a considerable variety of structural patterns for schooling and education. This variation and the relationships among different types of institutions and structures is illustrated in Figure 1. Each type of school or program is described briefly below.[4]

A nursery school is a center providing a child development program offering educational experiences for children in the year or two preceding their eligibility to enter kindergarten. It may be organized within a local school system or as a separate school. The programs may involve some form of parental participation.

Head Start programs are supported under the provisions of the Economic Opportunity Act. Such programs are administered by community action agencies although some delegate operational responsibility to local school systems. The bulk of the programs is a 12-month effort, but about a third of the effort is directed to summer activities. Head Start is an action program providing cultural enrichment activities, educational experiences, and needed services for children of pre-elementary-school age. The programs are designed to help economically disadvantaged children to catch up in their development to more advantaged children so that all may have the opportunity to obtain maximum benefits in their forthcoming elementary school programs.

Kindergarten programs are junior primary, preprimary, or preschool programs offering educational experiences in the year or two preceding entrance into the first elementary grade. They can be organized within the elementary school or as separate schools.

In the United States, a public school or college is any school or higher education institution established by public authority controlled and operated by publicly elected or appointed officials, and supported wholly or primarily by public funds.

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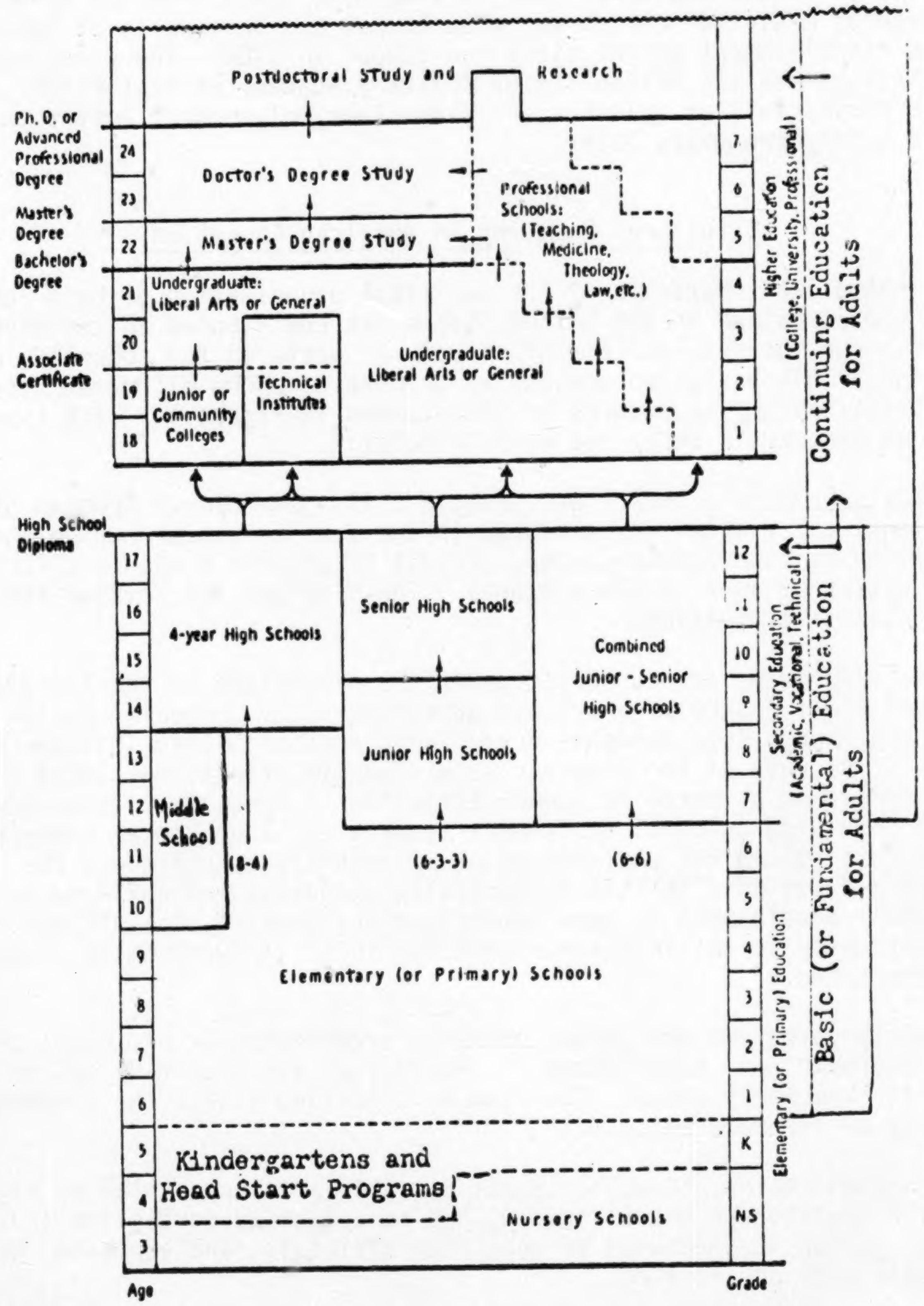
[4] Material in this section was drawn from the chapter prepared by the U.S. Office of Education for the UNESCO World Survey of Education, Volume V: Educational Policy, Legislation and Administration. Report of the United States of America.


Postdoctoral Study and Research
Ph. D. or Advanced Professional Degree
Doctor's Degree Study
Master's Degree
Master's Degree Study
Bachelor's Degree
Professional Schools: (Teaching, Medicine, Theology, Law, etc.)
Undergraduate: Liberal Arts or General
Associate Certificate
Junior or Community Colleges
Technical Institutes
Undergraduate: Liberal Arts or General
Higher Education (College, University, Professional)
Continuing Education for Adults
High School Diploma
4-year High Schools
Senior High Schools
Combined Junior - Senior High Schools
Junior High Schools
Middle School
(8-4)
(6-3-3)
(6-6)
Secondary Education (Academic, Vocational, Technical)
Basic (or Fundamental) Education for Adults
Elementary (or Primary) Schools
Elementary (or Primary) Education
Kindergartens and Head Start Programs
Nursery Schools
24
23
22
21
20
19
18
17
16
15
14
13
12
11
10
9
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6
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Figure 1. Structural Patterns in Systems of Education in the United States

A private or nonpublic school is any school or higher education institution established by a private individual or nongovernmental authority such as a church, religious denomination, commercial interest, industrial concern, or trade, controlled and operated by a private individual or nongovernmental authority, and supported primarily from private rather than public funds.

An elementary school is a primary school composed of any span of programs not above grade eight and with any program below the first of the maximum of eight grades being included only when the nursery school, kindergarten, or Head Start program is an integral part of the regularly established school system.

Middle schools are a gradually increasing phenomenon. They are schools which combine the four grades from five through eight. They stand midway between the first four grades of primary schooling and the four years of senior high school.

Junior high schools are three-year intermediate schools between the six-year elementary school and the three-year senior high school. They operate in those systems organizing the 12 grades below higher education on a six-three-three plan.

High schools are three- or four-year secondary schools offering an academic, technical, or vocational program or - when organized as a comprehensive high school - all three in the same institution, with offerings leading to graduation and a diploma. They may operate above the level of an eight-year elementary (eight-four) or a combined elementary/middle school system (four-four-four) or above the three-year junior high school and six-year elementary program where the organizing pattern is six-three-three.

A combined junior-senior high school is a six-year secondary school offering a program leading to graduation and a diploma and operating at the level above the six-year elementary school.

A junior or community college is a two-year institution of higher education. It may be organized as an independent institution, or part of an independent system of junior colleges, or may be the post secondary part of a local school system. Course offerings usually include curricula leading to credits which may be transferred toward a bachelor's degree in a four-year institution, occupational programs which are terminal in nature as preparation for careers at the semi-professional or technical level, general education, and continuing education for adults. (While there is no clear-cut distinction between the community and the junior college, the community college tends to be more community-centered in its control, administration and curricula. Its students tend to live within commuting distance. The junior college may draw students from greater distances and thus may be more apt to have residential facilities.)

A semi-professional school is a two-year independently organized institution of higher education offering terminal courses primarily designed to prepare for employment in a subprofessional and non-engineering related field. Courses of study frequently lead to the associate certificate and to the earning of credits which may be applied in whole or in part toward the first degree.

A technical institute is an institution organized as a division or department in a two- or four-year institution of higher education or as an independent institution of higher education. Typically, it offers two- or three-year terminal programs designed to lead to employment in engineering-related occupations rather than to the first degree. Courses sometimes lead to academic credit toward the first degree.

A college is an institution of higher education usually offering a curriculum in the liberal arts and sciences and frequently in one or more professional fields in addition, and empowered to confer the bachelor's degree for a four-year program and/or an associate certificate for a two- or three-year program beyond the secondary level. In a university, a college is an undergraduate division which corresponds in program and function to the above description.

A university is an institution of higher education usually including a college of liberal arts and sciences, two or more professional schools, and a graduate school. It stresses instruction and research above the first degree level and is authorized to confer the bachelor's degree, the master's degree, and usually the doctorate in a variety of liberal, professional, scientific, and technological fields.

A graduate school is a division of a university or separately organized institution offering programs of study and research at a level above the first degree (usually in the liberal arts and sciences) leading to the master's degree or the doctorate, and sometimes including post-doctoral programs.

A professional school is an institution organized as a major division of a college or university or as an independent institution for study and research in such professional or technological fields as architecture, business, education, engineering, law, medicine, the performing and plastic arts, physical sciences, and theology. Offerings lead to a professional degree such as bachelor of science in education or doctor of medicine and are usually designed to fulfill academic requirements for certification or licensure to practice in the particular field. Depending on the field of training, entrance requirements vary from secondary school graduation to completion of a preprofessional curriculum in a college of arts and sciences.

Continuing education for adults is education and training through avocational programs, extension or regular courses, refresher or retraining institutes, or longer programs. These are usually sponsored by an institution of higher education or other nonprofit agency or group for the benefit of those in the community and are designed to help widen horizons of participants for avocational, cultural, vocational, or professional purposes. They may be organized on either a formal or informal basis and, in some cases, may lead to academic credit toward a degree.

General Statistics of Education in the United States[5]

With the basic organizational and structural features of American education in mind, the full dimensions of the educational establishment in the United States can be brought into view through a presentation of a variety of statistical treatments of enrollment, financing, and educational outputs.

In the fall of 1967, education could be said to have been the primary occupation of 60 million Americans. Included in this total were more than 57 million students and nearly 3 million professional teachers, supervisors, principals, superintendents, and college and university administrators. In a nation of 198 million, more than three out of every ten persons were directly involved in the educational process.

Enrollment

In the fall of 1967, enrollment in educational institutions in the United States increased for the twenty-third consecutive year, reaching another all-time high. The number of students in public and nonpublic institutions at all educational levels totaled 57.3 million (Table 1). This total was 2.7 percent higher than the 55.8 million students enrolled one year earlier. The largest increase over the preceding year (9.3 percent) occurred at the higher education level. Enrollment in kindergarten through grade eight rose 1.3 percent, while that in grades nine through 12 increased 3.4 percent.

Since the end of World War II a dominant trend in this country has been for more and more persons to enter the educational system at an earlier age and to remain in school for a longer period of time than their older brothers and sisters. This trend is dramatically illustrated by comparing the latest available data on the percentage of five-year-olds and teenagers enrolled in school with the comparable percentages one or two decades ago (Table 2).

More than seven out of every ten five-year-olds currently attend school as compared with fewer than six out of ten in the 1940's and early 1950's. Seven-eighths of the 16- and 17-year-olds are now enrolled in school; in 1957, four-fifths were enrolled; and in 1947, only two-thirds were in school. Close to one-half of the 18- and 19-year-olds are still in school as compared with one-third of their counterparts in 1957 and one-fourth in 1947.

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[5] Material for this section was drawn from the latest issue of Progress of Public Education in the United States of America, 1967-1968. Washington: U.S. Government Printing Office, 1968.

TABLE 1 FALL ENROLLMENT IN EDUCATIONAL INSTITUTIONS, BY GRADE LEVEL AND TYPE OF SCHOOL: UNITED STATES, FALL 1966 AND 1967

Grade level and type of school	Fall 1966	Fall 1967	Percentage increase, 1966 to 1967
Total, elementary, secondary, and higher education	55,802,000	57,287,000	2.7
Kindergarten through grade 8	36,557,000	37,040,000	1.3
Public school systems (regular full-time)	31,157,000	31,640,000	1.6
Nonpublic schools (regular full-time)	5,200,000	5,200,000	0
Other schools [1]	200,000	200,000	0
Grades 9 through 12	13,298,000	13,747,000	3.4
Public school systems (regular full-time)	11,898,000	12,247,000	2.9
Nonpublic schools (regular full-time)	1,300,000	1,400,000	7.7
Other schools [1]	100,000	100,000	0
Kindergarten through grade 12	49,855,000	50,787,000	1.9
Public school systems (regular full-time)	43,055,000	43,887,000	1.9
Nonpublic schools (regular full-time)	6,500,000	6,600,000	1.5
Other schools [1]	300,000	300,000	0
Higher education: universities, colleges, professional schools, junior colleges, normal schools, and teachers colleges (degree-credit enrollment)	5,947,000	6,500,000	9.3

[1] Includes federally operated schools, subcollegiate departments of institutions of higher education, and residential schools for exceptional children.

Note.—All figures, except those for public elementary and secondary schools, are estimated. Fall enrollment is usually smaller than school-year enrollment, since the latter is a cumulative figure which includes students who enroll at any time during the year.

SOURCE: U.S. Department of Health, Education, and Welfare, Office of Education, surveys and estimates of the National Center for Educational Statistics.

TABLE 2 PERCENT OF THE POPULATION 5 TO 34 YEARS OLD ENROLLED IN SCHOOL, BY AGE: UNITED STATES, OCTOBER 1947 TO 1966

Year	Total, 5 to 34 years	5 years [1]	6 years [1]	7 to 9 years	10 to 13 years	14 and 15 years	16 and 17 years	18 and 19 years	20 to 24 years	25 to 29 years	30 to 34 years
1	2	3	4	5	6	7	8	9	10	11	12
1947	42.3	53.4	96.2	98.4	98.6	91.6	67.6	24.3	10.2	3.0	1.0
1948	43.1	55.0	96.2	98.3	98.0	92.7	71.2	26.9	9.7	2.6	.9
1949	43.9	55.1	96.2	98.5	98.7	93.5	69.5	25.3	9.2	3.8	1.1
1950	44.2	51.8	97.0	98.9	98.6	94.7	71.3	29.4	9.0	3.0	.9
1951	45.4	53.8	96.0	99.0	99.2	94.8	75.1	26.3	8.3	2.5	.7
1952	46.8	57.8	96.8	98.7	98.9	96.2	73.4	28.7	9.5	2.6	1.2
1953	48.8	58.4	97.7	99.4	99.4	96.5	74.7	31.2	11.1	2.9	1.7
1954	50.0	57.7	96.8	99.2	99.5	95.8	78.0	32.4	11.2	4.1	1.5
1955	50.8	58.1	98.2	99.2	99.2	95.9	77.4	31.5	11.1	4.2	1.6
1956	52.3	58.9	97.0	99.4	99.2	96.9	78.4	35.4	12.8	5.1	1.9
1957	53.6	60.2	97.4	99.5	99.5	97.1	80.5	34.9	14.0	5.5	1.8
1958	54.8	63.8	97.3	99.5	99.5	96.9	80.6	37.6	13.4	5.7	2.2
1959	55.5	62.9	97.5	99.4	99.4	97.5	82.9	36.8	12.7	5.1	2.2
1960	56.4	63.7	98.0	99.6	99.5	97.8	82.6	38.4	13.1	4.9	2.4
1961	56.8	66.3	97.4	99.4	99.3	97.6	83.6	38.0	13.7	4.4	2.0
1962	57.8	66.8	97.9	99.2	99.3	98.0	84.3	41.8	15.6	5.0	2.6
1963	58.5	67.8	97.4	99.4	99.3	98.4	87.1	40.9	17.3	4.9	2.5
1964	58.7	68.5	98.2	99.0	99.0	98.6	87.7	41.6	16.8	5.2	2.6
1965	59.7	70.1	98.7	99.3	99.4	98.9	87.4	46.3	19.0	6.1	3.2
1966	60.0	72.8	97.6	99.3	99.3	98.6	88.5	47.2	19.9	6.5	2.7

[1] Includes children enrolled in kindergarten.

SOURCE: U.S. Department of Commerce, Bureau of the Census, "Current Population Reports," Series P–20, No. 162 and No. 167.

Another indication of the same phenomenon is provided by Table 3, which shows the growth of secondary education in the United States. From 1890 to 1967, while the population 14 to 17 years of age rose little more than 2½ times, enrollment in grades nine through 12 increased 38 times. In 1890 only about one person in 15 in the 14-17 age group was enrolled in school; in 1967 the figure was more than nine out of ten.

Instructional Staff

As enrollment increases in the United States, there is a demand for more and more teachers at all educational levels. Between the fall of 1966 and 1967, the total teaching staff increased from 2.5 to 2.6 million, a rise of 4.7 percent (Table 4).

In recent years the number of public elementary and secondary school teachers has risen at a faster rate than the number of pupils enrolled. Consequently, there has been a slight decline in the number of pupils per teacher. As Table 5 indicates, there were 23.7 pupils per teacher in 1967 as compared with 25.7 pupils per teacher five years earlier.

Graduates

Paralleling the increase in school enrollment is a corresponding rise in the number and proportion of persons graduating from high school and college. As recently as 1890, only 3.5 percent of the young people were graduating from high school. That year may be compared with the year 1967, when there were 2,650,000 graduates, a number equal to more than 75 percent of the 17-year-olds in the population (Table 6). At the college level the contrast is even greater: the number of bachelor's degrees in 1967 was more than 36 times as great as in 1890, and the number of master's and doctoral degrees both increased more than a hundredfold (Table 7).

The number of earned degrees conferred by institutions of higher education in the year ending June 1966 is shown in Table 8. At the bachelor's level more degrees were conferred in education, social sciences, and business and commerce than in any other field. A large number of bachelor's degrees were also conferred in language and literature (both English and foreign languages), engineering, biological and physical sciences, mathematics, and fine and applied arts. The leading fields in terms of the number of master's degrees conferred were education, social sciences, and engineering. More than 2,000 doctoral degrees were conferred in each of five fields: education, physical sciences, engineering, social sciences, and biological sciences.

Vocational enrollments at the secondary level, stimulated by half a century of Federal assistance to State and local government, have recently begun to alter as new programs have been added to the traditional classes in agriculture, home economics, and trades and industry. The number of participants has increased at a rapid rate. More than 6 million students were enrolled in federally aided vocational classes in 1966 (Table 9).

TABLE 3 ENROLLMENT IN GRADES 9–12 OF PUBLIC AND NONPUBLIC SCHOOLS COMPARED WITH POPULATION 14–17 YEARS OF AGE: UNITED STATES, 1889–90 TO FALL 1967

School year	Enrollment, grades 9–12 and postgraduate [1]			Population 14–17 years of age [2]	Total number enrolled per 100 persons 14–17 years of age
	All schools	Public schools	Nonpublic schools		
1889–90	359,949	[3] 202,963	[3] 94,931	5,354,653	6.7
1899–1900	699,403	[3] 519,251	[3] 110,797	6,152,231	11.4
1909–10	1,115,398	[3] 915,061	[3] 117,400	7,220,298	15.4
1919–20	2,500,176	[3] 2,200,389	[3] 213,920	7,735,841	32.3
1929–30	4,804,255	[3] 4,399,422	[3] [4] 341,158	9,341,221	51.4
1939–40	7,123,009	6,635,337	487,672	9,720,419	73.3
1949–50	6,453,009	5,757,810	695,199	8,404,768	76.8
1951–52	6,596,351	5,917,384	678,967	[5] 8,516,000	77.5
1953–54	7,108,973	6,330,565	778,408	[5] 8,861,000	80.2
1955–56	7,774,975	6,917,790	857,185	[5] 9,207,000	84.4
1957–58	8,869,186	7,905,469	963,717	[5] 10,139,000	87.5
1959–60	9,599,810	8,531,454	1,068,356	11,154,879	86.1
1961–62	10,768,972	9,616,755	1,152,217	[5] 12,006,000	89.7
Fall 1963	12,255,496	10,935,536	1,319,960	[5] 13,499,000	90.8
Fall 1965 [6]	13,010,000	11,670,000	1,340,000	[5] 14,110,000	92.2
Fall 1967 [6]	13,750,000	12,310,000	1,440,000	[5] 14,605,000	94.1

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[1] Unless indicated, includes enrollment in subcollegiate departments of institutions of higher education and in residential schools for exceptional children. Beginning in 1949–50, also includes Federal schools.
[2] Includes all persons residing in the United States, but excludes Armed Forces overseas. Data shown are actual figures from the decennial censuses of population unless otherwise indicated.
[3] Excludes enrollment in subcollegiate departments of institutions of higher education and in residential schools for exceptional children.
[4] Data for 1927–28.
[5] Estimated by the Bureau of the Census as of July 1 preceding the opening of the school year.
[6] Preliminary data.

Note.—Beginning in 1959–60, includes Alaska and Hawaii.

SOURCE: U.S. Department of Health, Education, and Welfare, Office of Education, "Digest of Educational Statistics."

TABLE 4 NUMBER OF CLASSROOM TEACHERS IN ELEMENTARY AND SECONDARY SCHOOLS, AND INSTRUCTIONAL STAFF MEMBERS IN INSTITUTIONS OF HIGHER EDUCATION: UNITED STATES, FALL 1966 AND 1967 [1]

[Includes full-time and part-time teachers and staff]

Level and type of school	Fall 1966	Fall 1967	Percentage increase, 1966 to 1967
All levels	2,497,000	2,614,000	4.7
Elementary schools	1,176,000	1,217,000	3.5
Public (regular full-time)	1,005,000	1,040,000	3.5
Nonpublic (regular full-time)	157,000	163,000	3.8
Other [2]	14,000	14,000	0
Secondary schools	864,000	902,000	4.4
Public (regular full-time)	783,000	815,000	4.1
Nonpublic (regular fullti-me)	74,000	80,000	8.1
Other [2]	7,000	7,000	0
Elementary and secondary schools	2,040,000	2,119,000	3.9
Public (regular full-time)	1,788,000	1,855,000	3.7
Nonpublic (regular full-time)	231,000	243,000	5.2
Other [2]	21,000	21,000	0
Higher education [3]	457,000	495,000	8.3
Public	252,000	273,000	8.3
Nonpublic	205,000	222,000	8.3

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[1] All figures except those for public elementary and secondary schools are estimated.
[2] Includes federally operated schools, subcollegiate departments of institutions of higher education, and residential schools for exceptional children.
[3] Includes faculty for resident instruction in degree-credit courses; excludes faculty engaged in administration, research, extension work, etc.

SOURCE: U.S. Department of Health, Education, and Welfare, Office of Education, surveys and estimates of the National Center for Educational Statistics.

TABLE 5 COMPARATIVE STATISTICS ON ENROLLMENT, TEACHERS, AND SCHOOLHOUSING IN FULL-TIME PUBLIC ELEMENTARY AND SECONDARY SCHOOLS: UNITED STATES, FALL 1962 AND 1967

Item	Fall 1962	Fall 1967	Percentage change, 1962 to 1967
Enrollment			
Total	38,748,907	43,886,805	13.3
Elementary schools	25,263,661	27,381,259	8.4
Secondary schools	13,485,246	16,505,546	22.4
Classroom teachers			
Total	1,507,552	1,854,700	23.0
Elementary schools	886,161	1,040,160	17.4
Secondary schools	621,391	814,540	31.1
Pupil-teacher ratio			
All schools	25.7	23.7	
Elementary schools	28.5	26.3	
Secondary schools	21.7	20.3	
Instruction rooms			
Total available	1,438,384	1,709,000	18.8
Number completed during preceding school year	72,089	71,000	−1.5

SOURCE: U.S. Department of Health, Education, and Welfare, Office of Education, "Fall 1962 Enrollment, Teachers, and Schoolhousing" and "Fall 1967 Statistics of Public Schools."

TABLE 6 NUMBER OF HIGH SCHOOL GRADUATES COMPARED WITH POPULATION 17 YEARS OF AGE: UNITED STATES, 1869-70 TO 1966-67

School year	Population 17 years old [2]	High school graduates [1]			Number graduated per 100 persons 17 years of age
		Total	Boys	Girls	
1869-70	815,000	16,000	7,064	8,936	2.0
1879-80	946,026	23,634	10,605	13,029	2.5
1889-90	1,259,177	43,731	18,549	25,182	3.5
1899-1900	1,489,146	94,883	38,075	56,808	6.4
1909-10	1,786,240	156,429	63,676	92,753	8.8
1919-20	1,855,173	311,266	123,684	187,582	16.8
1929-30	2,295,822	666,904	300,376	366,528	29.0
1939-40	2,403,074	1,221,475	578,718	642,757	50.8
1949-50	2,034,450	1,199,700	570,700	629,000	59.0
1951-52	2,040,800	1,196,500	569,200	627,300	58.6
1953-54	2,128,600	1,276,100	612,500	663,600	60.0
1955-56	2,270,000	1,414,800	679,500	735,300	62.3
1957-58	2,324,000	1,505,900	725,500	780,400	64.8
1959-60	2,862,005	1,864,000	898,000	966,000	65.1
1961-62	2,768,000	1,925,000	941,000	984,000	69.5
1963-64	3,001,000	2,290,000	1,121,000	1,169,000	76.3
1965-66	3,524,000	2,644,000	1,314,000	1,330,000	75.0
1966-67 [3]	3,519,000	2,650,000	1,318,000	1,332,000	75.3

[1] Includes graduates of public and nonpublic schools.
[2] Data from the Bureau of the Census.
[3] Preliminary data.

Note.—Beginning in 1959-60, includes Alaska and Hawaii.

SOURCE: U.S. Department of Health, Education, and Welfare, Office of Education, "Digest of Educational Statistics."

TABLE 7 EARNED DEGREES CONFERRED BY INSTITUTIONS OF HIGHER EDUCATION: UNITED STATES, 1869–70 TO 1966–67

Year	Earned degrees conferred			
	All degrees	Bachelor's and first professional	Master's except first professional	Doctor's
1869–70	9,372	9,371	0	1
1879–80	13,829	12,896	879	54
1889–90	16,703	15,539	1,015	149
1899–1900	29,375	27,410	1,583	382
1909–10	39,755	37,199	2,113	443
1919–20	53,516	48,622	4,279	615
1929–30	139,752	122,484	14,969	2,299
1939–40	216,521	186,500	26,731	3,290
1949–50	496,661	432,058	58,183	6,420
1951–52	401,203	329,986	63,534	7,683
1953–54	356,608	290,825	56,788	8,995
1955–56	376,973	308,812	59,258	8,903
1957–58	436,979	362,554	65,487	8,938
1959–60	476,704	392,440	74,435	9,829
1961–62	514,323	417,846	84,855	11,622
1963–64	614,194	498,654	101,050	14,490
1965–66	709,832	551,040	140,555	18,237
1966–67 [1]	721,600	570,000	132,800	18,800

[1] Estimated.

Note.—Beginning in 1959–60, includes Alaska and Hawaii.

SOURCE: U.S. Department of Health, Education, and Welfare, Office of Education, "Digest of Educational Statistics" and "Earned Degrees Conferred."

TABLE 8 EARNED DEGREES CONFERRED BY INSTITUTIONS OF HIGHER EDUCATION, BY FIELD OF STUDY AND BY LEVEL: UNITED STATES AND OUTLYING AREAS, 1965–66

Area of study	Earned degrees conferred			
	Bachelor's (requiring 4 or 5 years)	First professional (requiring at least 6 years)	Second level (master's)	Doctor's (Ph. D., Ed. D., etc.)
All areas	524,117	31,496	140,772	18,239
Agriculture	5,730	0	1,363	537
Architecture	2,401	198	381	9
Biological Sciences	27,010	38	4,235	2,097
Business and Commerce	63,500	0	12,988	387
Computer Science and Systems Analysis	89	0	238	19
Education	118,399	22	50,478	3,063
Engineering	35,815	0	13,678	2,304
English and Journalism	42,321	2	6,788	714
Fine and Applied Arts	18,677	28	5,019	476
Foreign Languages and Literature	15,519	8	3,631	512
Forestry	1,443	23	303	51
Geography	1,934	0	370	58
Health Professions	15,054	13,253	2,867	251
Home Economics	5,724	0	740	54
Law	245	13,442	780	29
Library Science	619	23	3,916	19
Mathematical Subjects	20,090	3	4,772	782
Military Science	1,979	0	0	0
Philosophy	5,024	12	613	203
Physical Sciences	17,185	1	4,992	3,045
Psychology	17,022	0	2,530	1,046
Religion	4,036	4,443	1,946	333
Social Sciences	93,669	0	16,460	2,158
Trade and Industrial Training	2,357	0	44	11
Other Fields	3,275	0	1,640	81

SOURCE: U.S. Department of Health, Education, and Welfare, Office of Education, "Earned Degrees Conferred, 1965–66."

TABLE 9 ENROLLMENT IN FEDERALLY AIDED VOCATIONAL CLASSES, BY TYPE OF PROGRAM: UNITED STATES AND OUTLYING AREAS, 1919-20 TO 1965-66

School year	Total	Type of program						
		Agriculture	Distributive occupations	Home economics	Trades and industry	Health occupations	Technical education	Office occupations
1919-20	265,058	31,301		48,938	184,819			
1929-30	981,882	188,311		174,967	618,604			
1939-40	2,290,741	584,133	129,433	818,766	758,409			
1949-50	3,364,613	764,975	364,670	1,430,366	804,602			
1951-52	3,165,988	746,402	234,984	1,391,389	793,213			
1953-54	3,164,851	737,502	220,619	1,380,147	826,583			
1955-56	3,413,159	785,599	257,025	1,486,816	883,719			
1957-58	3,629,339	775,892	282,558	1,559,822	983,644	27,423		
1959-60	3,768,149	796,237	303,784	1,588,109	938,490	40,250	101,279	
1961-62	4,072,677	822,664	321,065	1,725,660	1,005,383	48,985	148,920	
1963-64	4,566,390	860,605	334,126	2,022,138	1,069,274	59,006	221,241	
1964-65	5,430,611	887,529	333,342	2,098,520	1,087,807	66,772	225,737	730,904
1965-66	6,070,059	907,354	420,426	1,897,670	1,269,051	83,677	253,838	1,238,043

SOURCE: U.S. Department of Health, Education, and Welfare, Office of Education, "Vocational and Technical Education."

School Retention Rates and Educational Attainment

Table 10 shows the increase in school retention rates from the fifth grade through college entrance over the past third of a century. During this period the proportion of fifth graders who went on to graduate from high school increased 139 percent: about 72 percent of former fifth graders graduated from high school in 1967, as compared with 30 percent in 1932. The increase in college attendance is even more striking. Approximately 40 percent of our young people now enter college; a generation ago the comparable figure was 12 percent. Retention rates for the high school graduating class of 1967 are shown in Figure 2.

Since 1940, the U.S. Bureau of the Census has collected statistics on the educational attainment of the population in this country. Table 11 compares the educational attainment of the population 25-29 years of age with the total population 25 years of age and older. The former group in March 1966 had completed one-half year of school more than had the total adult population. More than seven-tenths of the 25-29 age group were high school graduates, as compared with only one-half of all adults. Almost one-seventh of the 25- to 29-year-olds were college graduates, while only about one person in ten in the total population had completed his college education. Trends in the educational attainment of the adult population over the past two decades are shown in Figure 3.

Only 2.4 percent of the persons 14 years of age and over were illiterate in 1960 (Table 12). This illiteracy rate may be compared with that of 3.3 percent in 1950, 4.8 percent in 1930, and 11.3 percent in 1900. Thus the 20th century has seen a steady reduction in the percentage of persons in this country who are unable to read and write.

Income

Public elementary and secondary schools in the United States derive virtually all of their income from governmental sources. Income from other sources, such as gifts and fees, amounts to less than one-half of one percent of the total revenue receipts. Local governments contribute more than any other source, but in recent years the proportions from the Federal and State Governments have been increasing. In the school year 1965-66 approximately 53 percent of the revenue receipts of public schools came from local sources, 39 percent from State governments, and 8 percent from the Federal Government (Table 13 and Figure 4). The Federal contribution, between 1963-64 and 1965-66, rose from about $900 million to $2 billion.

Although State and local governments have the primary responsibility for public education in the United States, the Federal Government for many years has maintained an active interest in the educational process. Recently an increasing amount of Federal support for all levels of education has been provided through a variety of programs administered by a number of Government agencies. Federal grants supporting education in educational

TABLE 10 ESTIMATED RETENTION RATES, 5TH GRADE THROUGH COLLEGE ENTRANCE, IN PUBLIC AND NONPUBLIC SCHOOLS: UNITED STATES, 1924-32 TO 1959-67

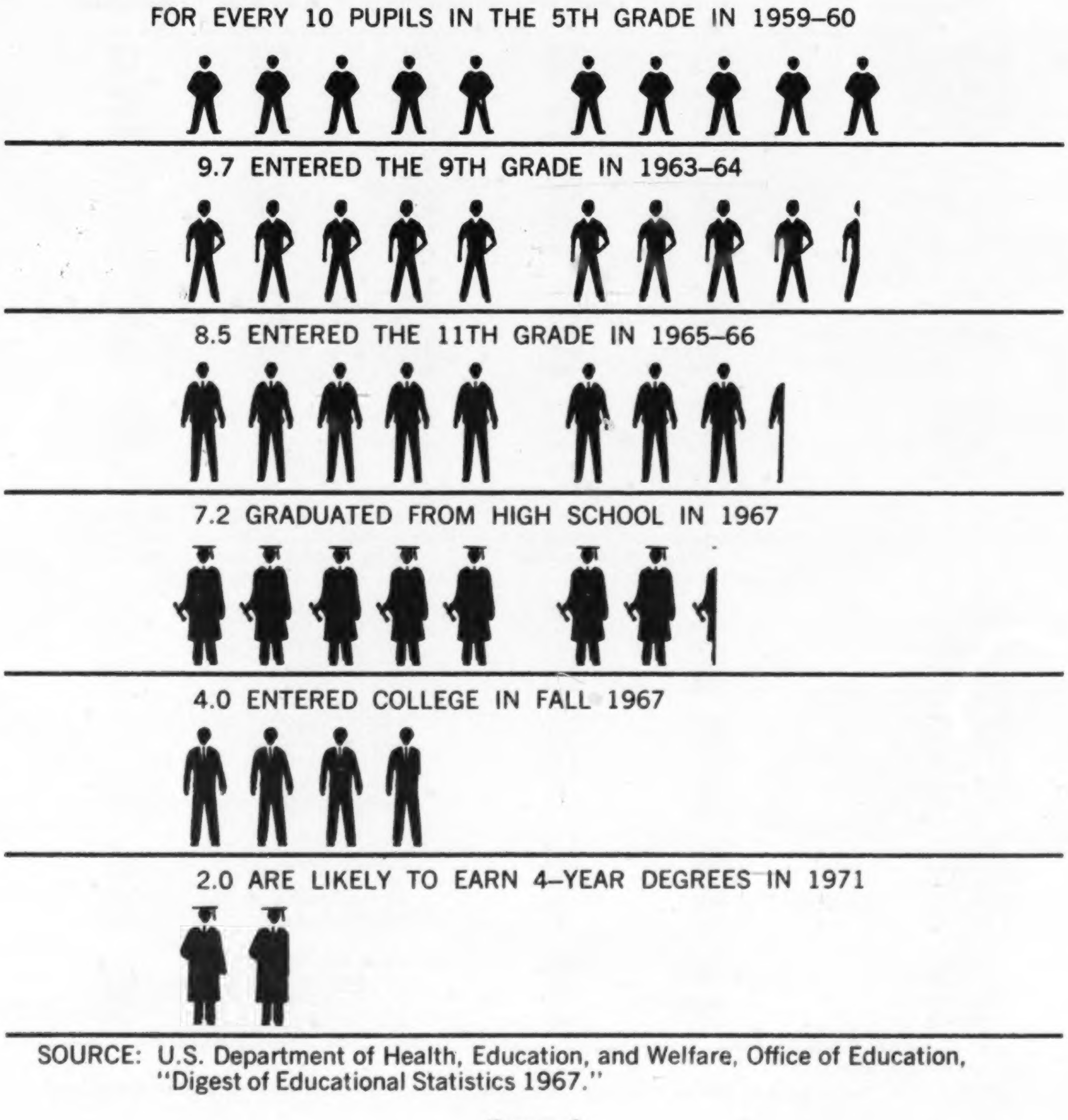
School year in which pupils entered 5th grade	For every 1,000 pupils entering 5th grade in a specified year, this number—				
	Entered 6th grade 1 year later	Entered 7th grade 2 years later	Entered 8th grade 3 years later	Entered 9th grade 4 years later	Entered 10th grade 5 years later
1924-25	911	798	741	612	470
1926-27	919	824	754	677	552
1928-29	939	847	805	736	624
1930-31	943	872	824	770	652
1932-33	935	889	831	786	664
1934-35	953	892	842	803	711
1936-37	954	895	849	839	704
1938-39	955	908	853	796	655
1940-41	968	910	836	781	697
1942-43	954	909	847	807	713
1944-45	952	929	858	848	748
1946-47	954	945	919	872	775
1948-49	984	956	929	863	795
1950-51	981	968	921	886	809
1952-53	974	965	936	904	835
1954-55	980	979	948	915	855
1956-57	985	984	948	930	871
1958-59	985	978	960	940	906
1959-60	990	983	976	966	928

	Entered 11th grade 6 years later	Entered 12th grade 7 years later	Graduated from high school 7 years later (i.e., in the year shown)	Entered college 8 years later
1924-25	384	344	302 (in 1932)	118
1926-27	453	400	333 (in 1934)	129
1928-29	498	432	378 (in 1936)	137
1930-31	529	463	417 (in 1938)	148
1932-33	570	510	455 (in 1940)	160
1934-35	610	512	467 (in 1942)	129
1936-37	554	425	393 (in 1944)	121
1938-39	532	444	419 (in 1946)	(1)
1940-41	566	507	481 (in 1948)	(1)
1942-43	604	539	505 (in 1950)	205
1944-45	650	549	522 (in 1952)	234
1946-47	641	583	553 (in 1954)	283
1948-49	706	619	581 (in 1956)	301
1950-51	709	632	582 (in 1958)	308
1952-53	746	667	621 (in 1960)	328
1954-55	759	684	642 (in 1962)	343
1956-57	790	728	676 (in 1964)	362
1958-59	838	782	717 (in 1966)	394
1959-60	853	785	721 (in 1967)	400

[1] Data not available.

SOURCE: U.S. Department of Health, Education, and Welfare, Office of Education, "Digest of Educational Statistics."

ESTIMATED SCHOOL RETENTION RATES, FIFTH GRADE THROUGH COLLEGE GRADUATION: UNITED STATES, 1969–1971



SOURCE: U.S. Department of Health, Education, and Welfare, Office of Education, "Digest of Educational Statistics 1967."

FIGURE 2

TABLE 11 LEVEL OF SCHOOL COMPLETED BY PERSONS 25 YEARS OLD AND OVER, AND 25 TO 29 YEARS OLD: UNITED STATES, 1940 TO 1966

Date and age	Percent by level of school completed			Median school years completed
	Fewer than 5 years of elementary school	4 years of high school or more	4 or more years of college	
25 years and over				
March 1966	6.5	49.9	9.8	12.0
March 1964	7.1	48.0	9.1	11.7
March 1962	7.8	46.3	8.9	11.4
March 1959	8.0	42.9	7.9	11.0
March 1957	9.0	40.8	7.5	10.6
October 1952	9.1	38.4	6.9	10.1
April 1950	10.8	33.4	6.0	9.3
April 1947	10.4	32.6	5.4	9.0
April 1940	13.5	24.1	4.6	8.4
25 to 29 years				
March 1966	1.6	71.0	14.0	12.5
March 1964	2.1	69.2	12.8	12.4
March 1962	2.4	65.9	13.1	12.4
March 1959	3.0	63.3	11.0	12.3
October 1952	3.8	56.7	10.0	12.2
April 1950	4.6	51.7	7.7	12.1
April 1940	5.9	37.8	5.8	10.4

Note.—Beginning in 1962, includes Alaska and Hawaii. Data for 1962 and 1964 are not strictly comparable with earlier years.

SOURCE: U.S. Department of Commerce, Bureau of the Census, "Current Population Reports," Series P-20, Nos. 99 and 158.

TABLE 12 PERCENT OF ILLITERACY[1] IN THE POPULATION: UNITED STATES, 1900 TO 1960

Year	Percent illiterate[2]	Year	Percent illiterate[2]
1900	11.3	1930	4.8
1910	8.3	1950[3]	3.3
1920	6.5	1960[3]	2.4

[1] Illiteracy is defined as the inability to read and write a simple message either in English or in any other language.

[2] Percentages refer to the population 15 years old and over from 1900 to 1930 and to the population 14 years old and over in 1950 and 1960.

[3] Estimated.

Note.—Data are for 50 States and the District of Columbia.

SOURCE: U.S. Department of Commerce, Bureau of the Census, "Current Population Reports," Series P-23, No. 8.

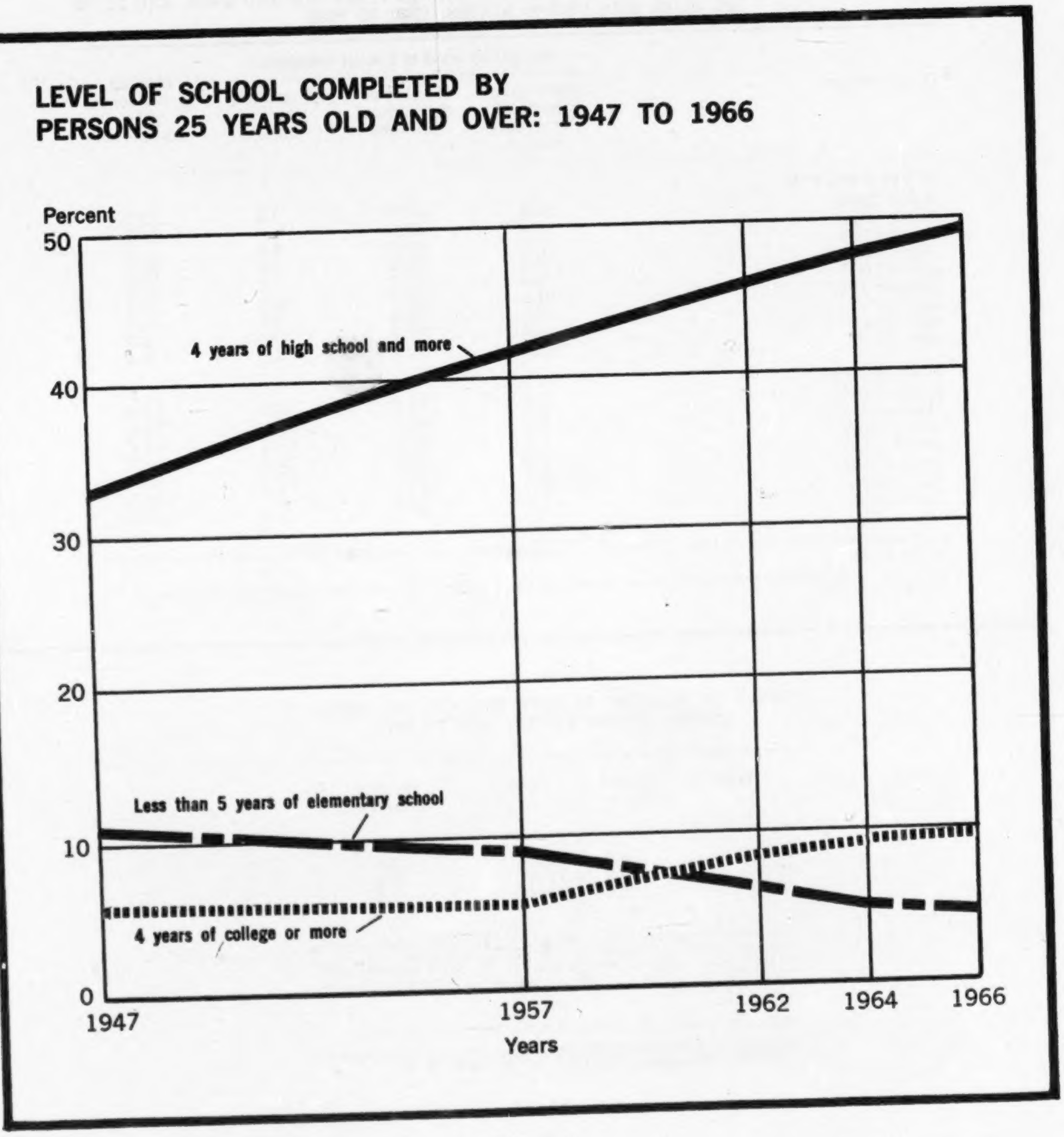

LEVEL OF SCHOOL COMPLETED BY PERSONS 25 YEARS OLD AND OVER: 1947 TO 1966
Percent
50
40
30
20
10
0
4 years of high school and more
Less than 5 years of elementary school
4 years of college or more
1947
1957
1962
1964
1966
Years

FIGURE 3

TABLE 13 REVENUE RECEIPTS FOR PUBLIC ELEMENTARY AND SECONDARY SCHOOLS, BY SOURCE: UNITED STATES, 1919-20 TO 1965-66

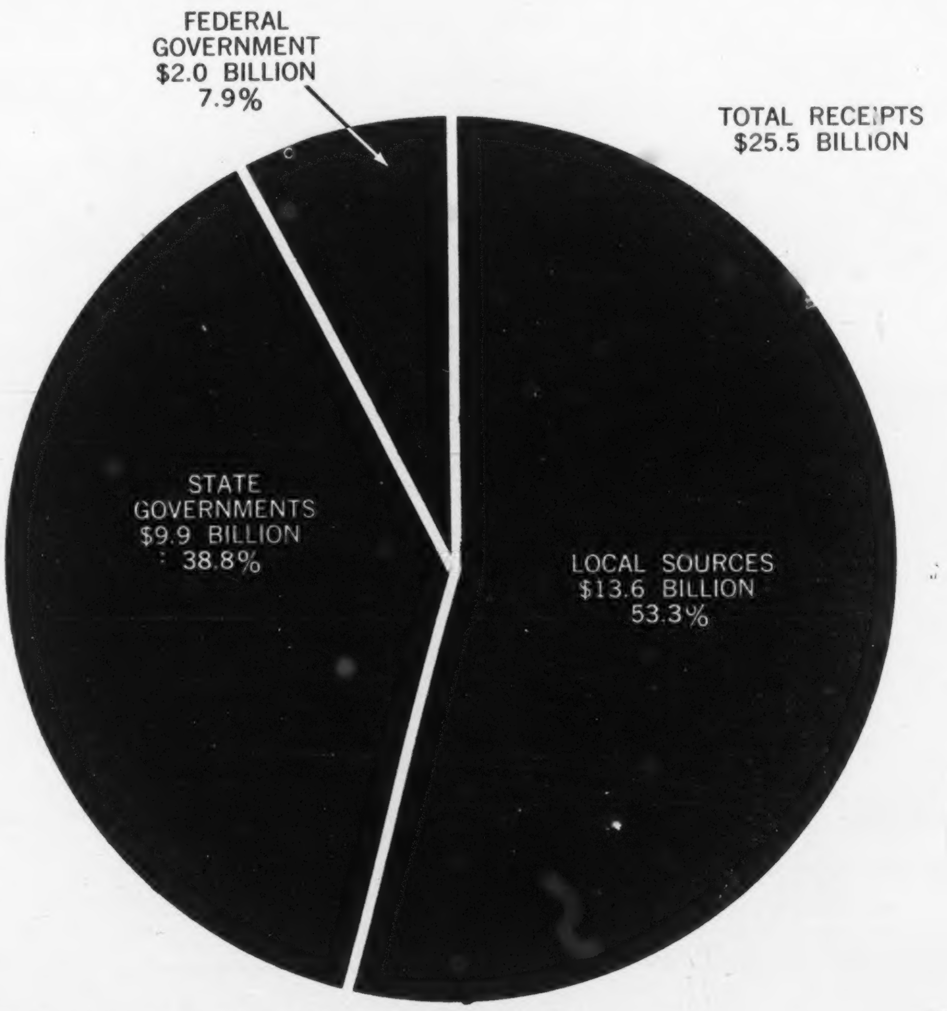
School year	Total	Federal Government	State governments	Local sources [1]
		AMOUNTS		
1919-20	$970,120,000	$2,475,000	$160,085,000	$807,561,000
1929-30	2,088,557,000	7,334,000	353,670,000	1,727,553,000
1939-40	2,260,527,000	39,810,000	684,354,000	1,536,363,000
1949-50	5,437,044,000	155,848,000	2,165,689,000	3,115,507,000
1951-52	6,423,816,000	227,711,000	2,478,596,000	3,717,507,000
1953-54	7,866,852,000	355,237,000	2,944,103,000	4,567,512,000
1955-56	9,686,677,000	441,442,000	3,828,886,000	5,416,350,000
1957-58	12,181,513,000	486,484,000	4,800,368,000	6,894,661,000
1959-60	14,746,618,000	651,639,000	5,768,047,000	8,326,932,000
1961-62	17,527,707,000	760,975,000	6,789,190,000	9,977,542,000
1963-64	20,544,182,000	896,956,000	8,078,014,000	11,569,213,000
1965-66 [2]	25,480,500,000	2,015,600,000	9,886,600,000	13,578,300,000
		PERCENTAGE DISTRIBUTION		
1919-20	100.0	0.3	16.5	83.2
1929-30	100.0	0.4	16.9	82.7
1939-40	100.0	1.8	30.3	68.0
1949-50	100.0	2.9	39.8	57.3
1951-52	100.0	3.5	38.6	57.9
1953-54	100.0	4.5	37.4	58.1
1955-56	100.0	4.6	39.5	55.9
1957-58	100.0	4.0	39.4	56.6
1959-60	100.0	4.4	39.1	56.5
1961-62	100.0	4.3	38.7	56.9
1963-64	100.0	4.4	39.3	56.3
1965-66 [2]	100.0	7.9	38.8	53.3

[1] Includes a relatively minor amount from other sources (gifts and tuition and transportation fees from patrons), which accounted for 0.4 percent of total revenue receipts in 1965-66.
[2] Preliminary data.

Note.—Beginning in 1959-60, includes Alaska and Hawaii. Because of rounding, detail may not add to totals.

SOURCE: U.S. Department of Health, Education, and Welfare, Office of Education, surveys of "Statistics of State School Systems."

REVENUE RECEIPTS FOR PUBLIC ELEMENTARY AND SECONDARY SCHOOLS, BY SOURCE: UNITED STATES, 1965–66



NOTE—Because of rounding, detail may not add to totals.

SOURCE: U.S. Department of Health, Education, and Welfare, Office of Education, *Statistics of State School Systems, 1965–66.*

FIGURE 4

institutions, for example, rose 80 percent between the fiscal years 1965 and 1966. Table 14 presents a summary of Federal funds for education, training, and related activities for the past two years.

Expenditures

Expenditures for public elementary and secondary education in the United States amounted to $26.2 billion during the school year 1965-66 and an estimated $31.2 billion in 1967-68 (Table 15). The total annual expenditure per pupil in average daily attendance rose from $652 in 1965-66 to an estimated $750 in 1967-68. These figures may be compared with an expenditure of $449 a decade ago.

According to the latest available figures on expenditures by purpose, public schools are expending approximately 55 percent of their funds for instruction and 14 percent for capital outlay. The remaining 31 percent is spent for a variety of purposes, including administration, plant operation and maintenance, fixed charges, other school services, and interest on school debt.

Table 16 and Figure 5 compare total expenditures for all levels of public and private education in the United States with the gross national product over the past four decades. Educational expenditures totaled approximately $45 billion during the school year 1965-66, an amount equal to about 6.6 percent of the gross national product. Preliminary estimates indicate that educational expenditures may have reached $52 billion in 1967-68. In relation to the gross national product, expenditures today are more than three times as great as they were during the middle 1940's.

Expenditures by institutions of higher education in the United States are shown in Table 17. Current fund expenditures more than quadrupled between 1929-30 and 1949-50, doubled again by 1957-58, and then more than doubled again by 1963-64. Between 1953-54 and 1963-64 by far the most rapidly growing expenditure purpose was for organized research; the increase is five-fold. Other expenditure purposes which grew at a rate faster than total expenditures were student-aid expenditures, general administration, and libraries.

Selected Issues Confronting American Education

Political underpinnings, structural organization, and a generalized statistical account of education in the United States provide relevant, if somewhat standard, approaches to the description of American education. A fourth somewhat more dynamic way of describing the present status is to present a sampling of some of the live issues now confronting policy-makers and implementers in legislative bodies, administrative organizations, and the actual institutions of instruction and education throughout the Nation. The issues, problems, and conditions discussed below are by no means exhaustive. They are, however, intended to provide some sense of the

TABLE 14 FEDERAL FUNDS FOR EDUCATION, TRAINING, AND RELATED PROGRAMS: FISCAL YEARS 1967 AND 1968

[New obligational authority]

Level and type of support	1967	1968	Percentage change, 1967 to 1968
Federal funds by educational level			
Total, other than loans	$6,433,000,000	$6,910,000,000	+7.4
Elementary-secondary education [1]	2,693,000,000	2,920,000,000	+8.4
Higher education [2]	2,246,000,000	2,359,000,000	+5.0
Adult, vocational-technical, and continuing education	1,494,000,000	1,631,000,000	+9.2
Loans, total	741,000,000	626,000,000	−15.5
Elementary-secondary education	2,000,000	2,000,000	0
Higher education	739,000,000	618,000,000	−16.4
Vocational-technical and adult education		6,000,000	
Other Federal funds for education and related activities			
Applied research and development [3]	2,167,000,000	2,276,000,000	+5.0
Related school services [4]	451,000,000	481,000,000	+6.7
Training of Federal personnel	1,530,000,000	1,672,000,000	+9.3
Library services [5]	185,000,000	187,000,000	+1.1
International education	338,000,000	341,000,000	+.9
Other	177,000,000	194,000,000	+9.6

[1] Excludes an estimated $2,000,000 each year for loans to private schools.

[2] Includes funds for college libraries; excludes amounts for research.

[3] Includes $640,000,000 (1967) and $65,700,000 (1968) for off-campus college-operated research centers.

[4] Includes amounts for school milk and cash and commodity distributions for schools.

[5] Includes amounts for public libraries, National Agriculture Library, National Library of Medicine, and Library of Congress.

SOURCE: Data based on "Special Analyses, Budget of the United States, Fiscal Year 1969," Chapter H, Federal Education, Training and Related Programs.

TABLE 15 TOTAL AND PER-PUPIL EXPENDITURES FOR PUBLIC ELEMENTARY AND SECONDARY EDUCATION: UNITED STATES, 1919-20 TO 1967-68

School year	Total	Total expenditure per pupil in average daily attendance	School year	Total	Total expenditure per pupil in average daily attendance
1919-20	$1,036,151,000	$64	1957-58	$13,569,163,000	$449
1929-30	2,316,790,000	108	1959-60	15,613,255,000	472
1939-40	2,344,049,000	106	1961-62	18,373,339,000	518
1949-50	5,837,643,000	259	1963-64	21,324,993,000	559
1951-52	7,344,237,000	313	1965-66	26,195,500,000	652
1953-54	9,092,449,000	351	1967-68 [1]	31,511,051,000	750
1955-56	10,955,047,000	388			

[1] Estimated.

Note.—Beginning in 1959-60, includes Alaska and Hawaii.

SOURCE: U.S. Department of Health, Education, and Welfare, Office of Education, "Statistics of State School Systems," and "Fall 1967 Statistics of Public Schools."

TABLE 16 GROSS NATIONAL PRODUCT RELATED TO TOTAL EXPENDITURES[1] FOR EDUCATION: UNITED STATES, 1929-30 TO 1967-68

Calendar year	Gross national product	School year	Expenditures for education	
			Total	As a percent of gross national product
1929	$103,095,000,000	1929-30	$3,233,601,000	3.14
1931	75,820,000,000	1931-32	2,966,464,000	3.91
1933	55,601,000,000	1933-34	2,294,896,000	4.13
1935	72,247,000,000	1935-36	2,649,914,000	3.67
1937	90,446,000,000	1937-38	3,014,074,000	3.33
1939	90,494,000,000	1939-40	3,199,593,000	3.54
1941	124,540,000,000	1941-42	3,203,548,000	2.57
1943	191,592,000,000	1943-44	3,522,007,000	1.84
1945	212,010,000,000	1945-46	4,167,597,000	1.97
1947	231,323,000,000	1947-48	6,574,379,000	2.84
1949	256,484,000,000	1949-50	8,795,635,000	3.43
1951	328,404,000,000	1951-52	11,312,446,000	3.44
1953	364,593,000,000	1953-54	13,949,876,000	3.83
1955	397,960,000,000	1955-56	16,811,651,000	4.22
1957	441,134,000,000	1957-58	21,119,565,000	4.79
1959	483,650,000,000	1959-60	24,722,464,000	5.11
1961	520,109,000,000	1961-62	29,366,305,000	5.65
1963	589,238,000,000	1963-64	36,010,210,000	6.11
1965	683,900,000,000	1965-66	[2] 44,800,000,000	6.55
1967	785,100,000,000	1967-68	[2] 52,200,000,000	6.65

[1] Includes expenditures of public and nonpublic schools at all levels of education (elementary, secondary, and higher education).

[2] Estimated.

Note.—Beginning with 1959-60 school year, includes Alaska and Hawaii.

SOURCES: U.S. Department of Health, Education, and Welfare, Office of Education, "Digest of Educational Statistics;" and U.S. Department of Commerce, Office of Business Economics, "Survey of Current Business," August 1965 and August 1967.

Table 17.—Expenditures of institutions of higher education: United States and outlying areas, 1929-30 to 1963-64

[In thousands of dollars]

Item	1929-30	1939-40	1949-50	1951-52	1953-54	1955-56	1957-58	1959-60	1961-62	1963-64
1	2	3	4	5	6	7	8	9	10	11
Current-fund expenditures	**$508, 471**	**$678, 560**	**$2, 259, 941**	**$2, 486, 229**	**$2, 902, 466**	**$3, 524, 744**	**$4, 543, 562**	**$5, 627, 962**	**$7, 190, 077**	**$9, 224, 988**
Educational and general	379, 055	525, 539	1, 717, 913	1, 933, 645	2, 288, 351	2, 788, 799	3, 634, 142	4, 536, 056	5, 798, 124	7, 466, 390
General administration and general expense	43, 030	63, 105	214, 477	235, 426	290, 533	358, 380	478, 166	587, 336	736, 189	964, 213
Instruction and departmental research	222, 067	281, 677	785, 420	827, 737	966, 769	1, 148, 510	1, 477, 350	1, 802, 871	2, 215, 992	2, 820, 631
Extension and public services	24, 982	35, 913	88, 389	99, 287	114, 680	141, 074	178, 928	208, 378	245, 189	298, 185
Libraries	9, 654	19, 575	56, 484	60, 948	73, 438	86, 133	110, 510	135, 913	178, 109	237, 851
Plant operation and maintenance	61, 205	69, 851	226, 246	241, 564	280, 047	326, 260	408, 938	473, 682	566, 023	689, 327
Organized research	18, 117	28, 121	227, 344	320, 362	374, 922	506, 097	733, 887	1, 024, 399	1, 481, 377	1, 982, 892
Related activities	(1)	27, 297	119, 553	148, 321	187, 962	222, 345	238, 924	294, 344	367, 233	459, 458
Sales and services expenditures	(1)	(1)	(1)	(1)	(1)	(1)	7, 439	9, 134	8, 013	13, 832
Auxiliary enterprises	(2)	124, 466	477, 983	479, 333	539, 326	639, 721	778, 034	917, 943	1, 160, 678	1, 455, 227
Student-aid expenditures	(2)	(2)	(2)	39, 795	74, 789	96, 224	131, 386	173, 963	231, 275	303, 371
Other current expenditures	129, 416	28, 555	64, 045	33, 456	----------	----------	----------	----------	----------	----------
Gross additions to plant value [3]	**125, 357**	**83, 848**	**418, 528**	**405, 665**	**533, 128**	**685, 550**	**1, 121, 674**	**1, 319, 514**	**1, 679, 675**	**2, 440, 917**

[1] Data not collected separately.

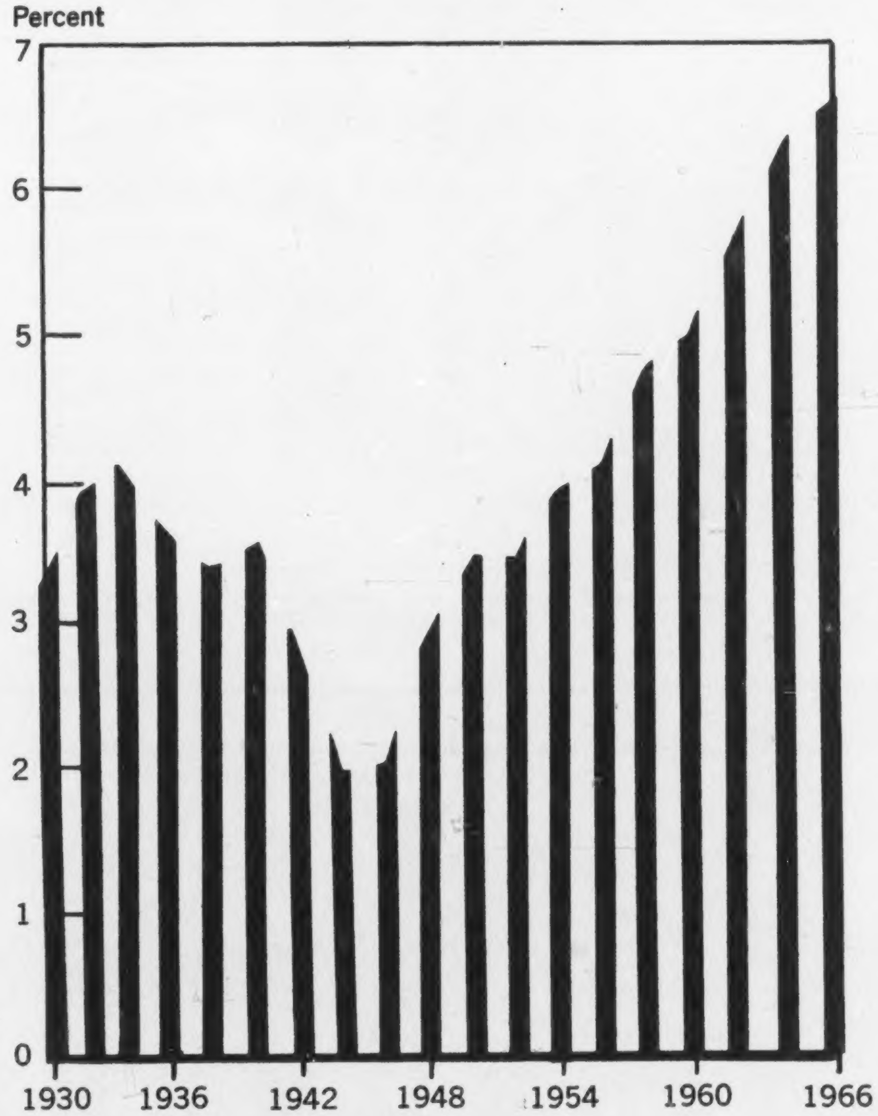
[2] Data not tabulated separately.

[3] Includes expenditures from plant and current funds, gifts and grants of plant assets, and increases in value due to reappraisal or other adjustments.

NOTE: Because of rounding, detail may not add to totals.

SOURCE: U.S. Department of Health, Education, and Welfare, Office of Education, surveys of "Financial Statistics of Institutions of Higher Education."

TOTAL EXPENDITURES FOR EDUCATION AS A PERCENTAGE OF GROSS NATIONAL PRODUCT: UNITED STATES, 1929–30 TO 1965–66



SOURCE: U.S. Department of Health, Education, and Welfare, Office of Education, "Digest of Educational Statistics" table 23.

FIGURE 5

kinds of issues and problems which currently confront educators in the United States and which presently shape a great deal of current-day educational debate.

Equality of Educational Opportunity

Probably no single issue, particularly if one considers all the different ramifications of it, has consumed as much attention in the United States in recent years as the question of equality of educational opportunity. The discussion arises out of consideration for the impact of race on education, the impact of social and economic disadvantagement on achievement, and the evolutionary shift in the interpretation of the concept itself.[6]

The first dimension of the issue concerns the entire question of race and education. The 1954 Supreme Court decision declaring segregated schooling inherently unequal, the legal measures taken since then to attempt to reduce the levels and patterns of segregation primarily in Southern and border States, the passage of the Civil Rights Act in 1964, and the Federal actions to enforce the provisions of that Act forbidding the expenditure of Federal funds under any program in which there is discrimination on the ground of race, color, or national origin all have bearing.

The problem is succinctly stated in the opening paragraphs of the major survey, Equality of Educational Opportunity.

> In its desegregation decision of 1954, the Supreme Court held that separate schools for Negro and white children are inherently unequal. This survey finds that, when measured by that yardstick, American public education remains largely unequal in most sections of the country, including all those where Negroes form any significant proportion of the population.[7]

Second, if equality of opportunity is measured in relation to the effects of education and instruction it is also clear that substantial problems exist. The persistence of the finding in survey after survey of the power of socio-economic variables in predicting student achievement[8] has contributed to the discussion, particularly now that the debate has begun to shift as a consequence of the redefinition of equal educational opportunity. Attention to results as the criterion measure - that is, to the idea that the existence of equality of educational opportunity should be judged in terms of the degree to which equality of results is achieved independently of differences in race, or national origin, or socio-economic background - has added fuel to the fire.

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[6] For a discussion of this change and the values and assumptions implicit behind it see James Coleman, "The Concept of Equality of Educational Opportunity," Harvard Educational Review, Winter, 1968, Vol. 38, No. 1, pp. 7-22.

[7] James Coleman, et al., Equality of Educational Opportunity. Washington: U.S. Government Printing Office, 1966, p. 3.

Concern for the disadvantaged, whether from socio-economic factors or the consequences of racial isolation, has led in recent years to the establishment of a number of major programs at the Federal level. For example, programs established under the Economic Opportunity Act (War on Poverty) that have been aimed at these problems include Job Corps, Upward Bound, Head Start, Neighborhood Youth Corps, and Follow-Through. The single largest program under the Elementary and Secondary Education Act of 1965 involves appropriations of over a billion dollars a year to support programs for the educationally deprived in the Nation's schools. Legislation and funds for higher education have been directed to the support of developing institutions of higher education, talent search programs, and the provision of educational opportunity grants to needy college-bound students.

Urban Education

Issues of great urgency surround urban education in America. Many of these are closely related to the problems associated with equality of educational opportunity. Concentrations of socio-economically disadvantaged Americans, rapidly increasing populations of minority groups - black, Mexican-American and Puerto Rican - (a growth partly related to disadvantagement and partly to unwritten barriers in housing), and a declining tax base have contributed to a crisis in urban education which has reached major proportions.

James E. Allen, Jr., recently State Commissioner of Education in New York and now Assistant Secretary and Commissioner of Education for the Nation, summarized the key factors in the urban education crisis in the following way:

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[8] In addition to the Equal Educational Opportunity Survey other major studies showing this same phenomenon include:
John C. Flanagan, et al., A Survey and Follow-up Study of Educational Plans and Decisions in Relation to Aptitude Patterns: Studies of the American High School. Pittsburgh, Pa: Univ. of Pittsburgh, Chapter 11.
Jesse Burhead, et al., Input and Output in Large-City High Schools. Syracuse: Syracuse Univ. Press, 1967, pp. 49-56.
Torsten Husen, editor, International Study of Achievement in Mathematics. New York: John Wiley & Sons, 1967, Volume II, p. 254.

- A concentration of school children in urban areas. Sixty percent of New York's school-age children, for example, are in the city school districts; 46 percent in the six largest cities; 40 percent in New York City.

- The great size of the population in some cities has resulted in systems of centralized bureaucratic educational control that are too remote and too complex to be responsive to neighborhood needs.

- This situation is compounded by the rapid population shifts of recent decades resulting in an urban concentration of minority population groups blocked by barriers of race and language from full participation in the social, economic, political and educational life of the cities. This condition has nurtured growing distrust of the established order and institutions of education.

- Cities have a disproportionately high percentage of those most difficult to educate; more than three-fourths of all those children classified as economically "deprived" and educationally "disadvantaged" in New York are in the cities; the school drop-out rate in our six largest city school systems is 15 percent greater than for the rest of the state; the percentage of pupils falling below minimum reading competence is nearly twice that for the rest of the state.

- The loss of economic strength of the cities, the so-called "municipal over-burden" -- the heavy burden on the tax dollar because of the demands of public safety, welfare, and other city services -- and restrictions of state legalities, are straining the cities' capacities to finance the kind and quality of education required.[9]

According to the Bureau of Census, the nonwhite population in the central cities of 212 Standard Metropolitan Statistical Areas (SMSA's) increased by 51 percent between 1950 and 1960 and grew at an even faster rate between 1960 and 1966.[10] Of the 2.9 million gain in the nonwhite population over the past six years, 2.5 million was in the central cities of the 212 SMSA's. Even more significant for educational policy is the unprecedented rise in the nonwhite teenage population and children under 14 years of age in the central cities. The number of nonwhite teenagers increased by over 50 percent over the six-year period, 1960-66, about twice as fast as the teenage population nationally. Nonwhite children under 14 years increased at an average annual rate three times as high as that of white children. Of this increase, 95 percent was in the central cities. The redistribution of urban peoples has left the central city school system with a disproportionate number of pupils who are disadvantaged in terms of income level, educational background of their parents, and general home environment. School enrollments in the twenty major cities in the Nation are characterized by a high degree of de facto racial segregation, a reflection of rigid and uniform patterns of residential segregation. The growing economic and educational disparities among urban populations have intensified differences between the central city and its suburb which encourage and further widen the gap. It is expected that by 1975, barring major changes, the twenty largest American cities, which together account for over half the Nation's nonwhite population, will be experiencing extreme economic and racial segregation.[11]

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[9] James E. Allen, Jr., "Non-Urban School Boards and the Problem of Urban Education," Compact, Vol. 2, No. 2, March, 1968, p. 13.

[10] Estimates from the Current Population Survey conducted by the Bureau of the Census, Series P-20, No. 163.

Teacher Unrest - Teacher Militancy

The recent changes in the degree of teacher activism which has become manifest in American education in the last two or three years are not unrelated to the new definition of equality of educational opportunity and the urban crisis. But the issue is larger than any simple derivative of poverty and increasing urbanism.

Aggressive, militant behavior on the part of teachers is attributable to a number of factors. Some are relatively new; others have long been with us; still others have emerged gradually over the past ten to twenty years.

Certainly one long-standing issue is related to income. Governor John Chafee of Rhode Island in a panel session on the question of teacher militancy remarked that along with a number of other factors, when "teachers see that a laborer can get $4.30 a hour, $172 a week, and $8,900 for 52 weeks a year - greater pay than any major school system in the nation offers as a starting salary for a school teacher with all his education" then it is not surprising that teachers might be affected.[12]

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[11] This material is from Profiles of Fifty Major American Cities (mimeographed), U.S. Office of Education, Department of Health, Education, and Welfare, May, 1968.

[12] Quoted in "Panel I: Teacher Unrest: The Root Causes," Compact, Vol. 2, No. 4, August, 1968, p. 11.

Certainly some of the new militancy of the educational profession, particularly at elementary and secondary levels, can be attributed to the spirited competition between the two professional organizations, the National Education Association and the American Federation of Teachers. The earlier willingness of the AFT to employ strikes or work stoppages as a bargaining tool and the NEA decision to change its opposition to work stoppages or withdrawal of services in favor of helping to resolve work stoppages and impasses after they have occurred are relevant factors.

Both the financial question and the role of the two professional organizations are in some sense symptomatic rather than root causes. There are a number of fundamental reasons for the unrest which exists. One can be traced to the accountability which the public is increasingly demanding of schools and teachers. There is also gradual isolation and bureaucratization of school administrative structures which removes administrators from direct contact with instruction. At the same time this removes authority from front-line practitioners who are called upon to make decisions and carry out instructional responsibilities.

The table presented below illustrates the sharp increase in teacher militancy as reflected in strikes or work stoppages. Estimates of National Education Association and American Federation of Teachers leaders for the school year 1968-69 indicate that as many as three to four hundred school strikes may take place.[13]

Table 18. -- Summary of Teacher Strikes and Work Stoppages by School Year and Type of Organization[14]

School year, type of organization, and month	Number of strikes and work stoppages		Estimated number of personnel involved		Estimated number of man-days involved	
	Number	Percent of total	Number	Percent of total	Number	Percent of total
1	2	3	4	5	6	7
SCHOOL YEAR						
1960-61	3	1.59%	5,080	1.93%	5,080	.32%
1961-62	1	.53	22,000	8.36	22,000	1.38
1962-63	2	1.06	2,200	.84	3,000	.19
1963-64	5	2.65	11,980	4.55	24,020	1.51
1964-65	12	6.35	15,083	5.73	27,453	1.72
1965-66	18	9.52	33,620	12.77	49,220	3.09
1966-67	34	17.99	10,633	4.04	29,079	1.82
1967-68	114	60.32	162,604	61.78	1,433,786	89.97
TYPE OF ORGANIZATION						
Teacher union	76	40.21%	111,456	42.35%	942,234	59.13%
Professional association ..	103	54.50	149,147	56.67	643,697	40.39
Joint union/association ...	5	2.64	2,186	.83	5,426	.34
Independent organization ..	1	.53	130	.05	1,430	.09
No organization	4	2.12	281	.10	851	.05

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[13] Jack Star, "Our Angry Teachers," Look, September 3, 1968.

[14] This table is adapted from one presented in Teacher Strikes and Work Stoppages, January 1940 to July 1968, NEA Research Memo 1968-15, p.4.

The Relevance of Education

A key question now being raised by many individuals and groups is aimed at the degree to which the curricula and instructional programs offered by schools, colleges, and universities are relevant to the students in attendance and, in certain instances, to the communities from which the students come. Students are raising the question; so are parents, teachers, and laymen.

Students at colleges and universities for five years have been extremely active in respect to this issue. They have insistently, painfully, and sometimes eloquently, confronted their mentors in administration and teaching faculty with their concerns. One is that the undergraduate curriculum, particularly in the liberal education areas, is unsuited to their real interests and needs as it is presently structured and taught. Nor is it related to their present propensities or to the society of which they are, and will be, a part.

The problem has found expression not just on four-year campuses and universities. It is being asked on junior and community college campuses. In recent months it has become clear that secondary school students are beginning to participate in the debate and, in a few instances already, in the same mode of confrontation which has affected so many American institutions of higher education in recent years.

A special but important case of this concern for the relevance of instruction and education can be found in the emerging interest in the development of educational programs expressive of and contributive to the special cultural backgrounds of the children attending. This interest is found particularly in black urban centers but also in Mexican-American communities. Demands for black studies in both lower and higher education are being made and responded to by educators. Attention is also being paid to the inclusion of materials, curricula, and approaches which respect the interests or desires of our cultural minorities in the United States.

The Control of Education

Renewed attention is also being paid to a range of issues dealing with the control of education. The problem of who should control education in the United States is a long-standing one; its history is suggestive in relation to the present dimensions of the debate.

Certainly one of the liveliest areas of concern about education in the United States is over the question of community control of schools. The general relevance of education, the urban problem, equal educational opportunity, and teacher militancy are intimately tied to the questions regarding control of education, particularly in urban settings. The problems which the city of New York encountered in the fall of 1968 and to which it is still subject give ample evidence of the seriousness of these issues; New York City's teachers struck the public schools for two months over issues directly related to community control of schools.

The problem is easily larger than that of the city and cultural minorities. Traditions of local and State control of education are an integral part of the educational scene in the United States. Many feel, however, that the financial crises which confront education can only be met through gaining access to the Federal taxing power. The present patterning of support for education, particularly at the elementary and secondary level, places heavy emphasis on the property tax. In many communities this burden is becoming intolerable. Looking to the States for higher proportions of school support is one answer, but it does not begin to reach larger issues of the equalization of resources across State lines which are also important.

Even as the national Congress has passed and supported categorical legislation in support of education, it has also deeply respected traditions of local control. Thus no piece of Federal education legislation is complete without the specific stipulation that no provision of the act is to be construed as permitting or authorizing the Federal control of education. The legislation is seen as permissive; authority and responsibility for the programs is to rest firmly in State and local hands.

Nevertheless, many at State and local levels are unconvinced that such legislative stipulations make much difference. Certain aspects of Federal law -- the Civil Rights Act of 1964 contains several examples -- are prescriptive rather than permissive. While such acts impact on education only as a consequence of pertaining to any kind of Federal appropriation, such regulation is still construed as a danger and a threat to local control of education.

Other aspects of Federal legislation, for example, its categorical nature, are also seen as a limitation on local prerogatives. Proponents of this view aver that, while within any given program that might be authorized by the Congress a great deal of local prerogative may be retained, it is still the case that the options exist only within the area authorized by the legislation. Thus, for example, while a school can do virtually anything it wants to with the funds that it receives under authorizations providing aid for educationally deprived youngsters, it is still true that the money must be used for that purpose and not for the general support of education. That is, of course, a classic dilemma. It is not easy to resolve. It affects the character of the debate about the support, goals, and reformation of education in the United States and is a key factor in understanding the American system.

The Improvement of Education

No more appropriate issue could be found to conclude this chapter than consideration of another live issue in the United States regarding education, namely, how to go about improving it.

Several different, not necessarily mutually exclusive, approaches to educational improvement can be identified. One approach, for example, argues that what schools and colleges really need is simply a greater supply of money. If the schools could obtain more, so this position goes, they would be able to install the kinds of programs they already know would represent improvements in American education.

Another approach to improvement moves from a political rather than a financial base. Political approaches to improvement hold that alteration in the governmental structures for the support or administration of education will produce significant improvement. Often, together with this approach, there is strong emphasis on the accountability of professional personnel to lay political leadership or to the public. School decentralization, provisions for student participation in the governance of higher education, and the release of achievement scores school by school are typical suggestions.

A third approach finds the source of improvement in alterations in the organizational structure of educational institutions, alterations that are designed to help those institutions better accomplish their instructional missions. Nongrading, team teaching, and flexible or modular scheduling are examples of these kinds of organizationally based innovations in education, justified in terms of real improvements that will result.

A fourth road to school improvement might be characterized in terms of its emphasis on professional role. Under this approach, particular attention is paid to the labor-intensive character of contemporary schools and to the different roles played by education personnel. Improvement is sought through the redirection of the programs created to train such people.

Finally, a fourth approach, by no means necessarily separate or discrete from any of these identified above, is the very subject of this study. Protagonists of this view hold that the improvement of education rests ultimately on the expansion of the knowledge base in such areas as: human learning; the manner in which teacher role affects student achievement; the operations, support, and political structure of schools and universities; and the social factors affecting learning and the maintenance, support, and goals of education. On the basis of that knowledge, instructional systems and organizations, curriculum materials and the like must then be carefully designed, tested, and validated. When this has been done, the alternatives thus developed can be made available to school and university officials, practitioners, and policy-makers as live options for installation and adoption in operating settings.

These several "positions" on educational improvement cannot all be found quite so sharply drawn in the real world as they are presented here. In practice, they tend to shade into one another. On the other hand, they are representative of a few (certainly not all) of the different kinds of starting points for discussions about paths to educational improvement. They are set out here to illustrate that research and development for education _competes_ with other strategies for educational improvement, even though, in some eyes, R&D complements those other strategies or necessarily underlies them.

Summary

A vast, decentralized, and pluralistic establishment, education in the United States embraces full-time the daily lives of almost a third of the entire population. The expansion of enrollment continues absolutely as the population increases and proportionately as downward and upward extension of schooling continues to develop. Since the 1940's expenditures on education have tripled relative to the gross national product.

But it is also clear that serious problems confront American education. The achievement of equality of educational opportunity defined in terms of attainment or results, meeting the problems of urban and rural education, coping with teacher militancy and student unrest, and evolving sensible strategies to qualitative improvement are just a few of the issues which presently confront educational policy-makers. The role of educational research and development in all of this is neither easy nor obvious.

Chapter III

AN HISTORICAL OVERVIEW OF EDUCATIONAL RESEARCH IN THE UNITED STATES

How did educational research in the United States evolve? What stages of growth can be identified? What is the background, immediate and longer term, to the present condition of ferment and what might be termed the first signs of the new stage of adolescence in educational research and development?

The following abbreviated survey[1] of the evolution of educational research in the U.S. is divided into four somewhat arbitrary periods: the first from 1855 to 1895; the second from 1895 to about 1938; the third from 1938 to 1954; and the fourth, from 1954 to the present.

The Emergence of Education as a Field of Study (1855-1895)

Education became a topic of continued and serious scholarship in the mid-1850's and after. This represented a radical development, for prior to that time writings on pedagogy were scattered, there was little reflection on the aims and content of education, and relatively few persons made teaching a life work. Little status was accorded the profession of teaching, which was seen as involved more in schoolkeeping than schoolteaching. The principal qualification for a teaching post in the 1850's, as it had been for generations, was good moral character. While people believed in education, inquiry into its means and ends were neither speculative or the codification of common sense.

Into this situation Henry Barnard projected the American Journal of Education, a periodical "devoted exclusively to the History, Discussion, and Statistics of Systems, Institutions, and Methods of Education, in different countries with special reference to the conditions and wants of our own." Drawing educational information from all ages and places, Barnard presented biographies of educators, translations of classical documents, pedagogical exercises, hints to teachers, model lessons, and treatises by philosophers and psychologists.[2] Barnard gathered, systematized, and published the materials for a "science of education," and gave teachers and policy makers convenient access to the educational wisdom of ancient and modern times. While Barnard possessed and displayed quite definite biases in the material which he selected for the Journal, he nonetheless vastly expanded the purview of American educators, forcing them to contend with unfamiliar aspects of their own traditions. But he also exerted a direct reformist influence by presenting ideas, information, and materials favoring a more humane pedagogy, a more utilitarian curriculum that gave greater recognition to scientific and technical developments, and more effective governmental administration of education.

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[1] Grateful acknowledgement is made to the Macmillan Company, to the National Academy of Education, and to Lee J. Cronbach and Patrick Suppes (editors) for permission to abridge and otherwise draw heavily on Chapter II (prepared originally by Lawrence Cremin) of Research for Tomorrow's Schools: A Disciplined Inquiry for Education (New York: The Macmillan Company, 1969) in the account of the history of educational research down to 1954.

The Journal was not the only arena in which Barnard's interest in educational scholarship found expression. He, as much as any man, was instrumental in the creation and early shaping of the federal Bureau of Education, the forerunner of the present-day U.S. Office of Education.[3] When "An Act to Establish a Department of Education" was finally passed in 1867, the first section echoed an earlier Barnard call by defining the chief purpose of the new department as one of "collecting such statistics and facts as shall show the condition and progress of education in the several states and territories, and of diffusing information respecting the organization and management of schools and school systems and the methods of teaching."

While many school men hoped that the agency would engage in the collection of statistics on enrollment, expenditures, and similar practical matters, Barnard expressed a primary interest in the serious consideration of the nature and quality of education. He looked forward to the preparation of a lengthy series of official reports containing accounts of educational experiments, statistics of national school systems, discussions of educational reform and reformers and biographies of great teachers. Unfortunately, Barnard was unable to persuade Congress of the importance of his plan and he gave up the Commissionership after three years.

In some measure, his departure was no doubt hastened by Congressional discontent. The Congress had expected the new department to plunge forcefully into the business of setting up a new educational system for the just-freed Negroes of the South, but apparently Barnard failed to satisfy them on this score and his annual appropriation was reduced each year.[4]

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[2] Richard E. Thursfield, Henry Barnard's American Journal of Education. Baltimore, Maryland: John Hopkins Press, 1949.

[3] Harold F. Carpenter, Jr., "The First Eight Commissioners of Education." The Graduate Review, Stanford University, School of Education. Vol. 2, 1967, pp. 27-45.

Barnard's successor as Commissioner -- John Eaton -- strongly developed the program of collecting educational statistics, and he overcame the reluctance of local school men to fill out factual report forms for Washington. Eaton was succeeded briefly by a nonprofessional, Nathaniel H.R. Dawson, who held the Commissionership for three years. Under Dawson, a Division of Statistics was created and a number of qualified men were commissioned to prepare historical and descriptive accounts of higher education in their respective states.

In 1889, William T. Harris, a rare combination of scholar-administrator, left the superintendency in St. Louis to succeed Dawson as Commissioner. Under Harris the systematic inquiries of the Department of Education expanded in directions Henry Barnard would have prized: historical, comparative, and philosophical. Harris focused public and professional attention on the great philosophical and sociological questions that require systematic examination if a society's educational system is to reflect its most deeply held values. Using the publications of the Bureau much as Barnard had used the American Journal, Harris brought together, for American educators to confront and consider, the relevant historical, philosophical, and sociological materials from the nations of the West.

During this formative era of the United States Office of Education, there was also a quickening of State educational activity. Annual reports became regularized, educational jounals were launched, and the professional community began to develop among career educators. Reports from State education officers were especially influential in the communication of educational ideas. There was an interchange of ideas between the States, through the reports themselves and discussion of them in the growing number of State educational journals. The national data collection efforts initiated by Barnard and Eaton had a stimulating and disciplining effect on State efforts to keep track of their school systems.

In the first period of educational leadership in America, the style of research was collection, collation, and dissemination of facts. Barnard, Eaton and Harris seemed satisfied that diffusion of information would in itself produce sounder management of schools. Curriculum reformers were engaged primarily in the popularization of new ideas that seem to have come largely from European sources. While American educators debated the various proposals for change in the schools, systematic analyses and testing of proposals came to the fore only at the very end of this period.

Empiricism in its Heyday (1895-1938)

The 1890's witnessed a sweeping change in the intellectual orientation of

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[4] J.J. Tigert, "An Organization by the Teachers and for the Teachers." School Life, Vol. 9, 1924, pp. 195-196.

American society. It was an age of quickening interest in scientific exploration of social and natural phenomena and of high hope concerning the social benefits of such exploration. It was an age of scientific enthusiasm not only among scholars, but also among the lay audiences that devoured the popularized science magazines. Not surprisingly, it was an age when education became a matter for scientific investigation, controlled experiment, and rational reform. Thorndike and other psychologists drew practical recommendations from studies of learning. Franklin Bobbitt and other curriculum makers revised courses of study on the basis of systematic observations of contemporary society. George Strayer and other administrators formulated policy recommendations founded on quantitative analyses of school performance.

Perhaps most important of the significant contributions of this period was the widespread acceptance of pupil accomplishment as the fundamental test of educational program. Argumentation from a priori principles was replaced with an appeal to evidence. Misconceptions were banished and the ground of controversy narrowed. Many an ancient claim was exploded, most notably, the faith that the pupil who grinds away at an academically difficult subject is sure to develop his intellectual powers.

Gains were not confined to the psychological aspects of education. Decisions about curriculum that had formerly been settled by pronouncements by committees came more and more to rest on careful assessment of the manpower needs of society and the tasks persons in various roles actually perform. Matters that had been taken for granted for generations were freshly examined. For example, certain grammatical expressions roundly condemned in the schoolbooks were found to be commonplace and accepted in the actual speech and writing of cultivated persons. Usage began to take the place of grammar as the basis of courses in English. The finding that the income of an adolescent's family had more to do with attending college than his ability, and the companion finding that he was far more likely to attend college if one were located near his home, led to new reflections on educational policy.

The journalistic exposes of Joseph Mayer Rice described the American school of the 1890's where the chief task of the pupil was to master the material that would appear on examinations and the chief task of the teacher was to assist the pupil to that mastery, relying principally on incessant drill and reflecting discipline. But four decades later the 1938 Yearbook of the National Society for the Study of Education could point to an almost wholly new curriculum, with an elective system that spanned dozens of school subjects; to a range of instructional methods that embraced laboratories, field trips, visual aids, school libraries; to consolidated high schools offering vocational as well as academic curricula; to vocational guidance programs and diagnostic services directed by school psychologists; to school buildings designed for educational efficiency and built to high standards; and to enormous advances in the preparation, style of work, and salaries of teachers.[5]

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[5] G.M. Whipple, (ed.), The Scientific Movement in Education, 37th Yearbook, National Society for the Study of Education, 1938.

William James and G. Stanley Hall stand at the dividing point between the first period of educational improvement in the later 19th century (which grew from the requirements of the American democratic experiment) and the second period of educational improvement in the earlier 20th century (which grew largely out of the transformations wrought by industrialism).

James's psychology was characteristically American. For all his ability to reason and his readiness to seek evidence, James's common sense was the most prominent element in his writings. Hall's interests were even broader than James's. But Hall did gather data, and indeed was a pioneer in the fruitful application of the questionnaire method. His most lasting influence on American education was his inauguration of the child-study movement, which provided popular and scholarly support for efforts to liberalize the curriculum.

The turn of the century also witnessed the arrival on the educational scene of John Dewey, Thorstein Veblen, Paul Monroe, E.L. Thorndike, and Joseph Mayer Rice, to be followed soon after by Charles H. Judd, Lewis Terman, George Strayer, Ellwood P. Cubberley, and Franklin Bobbitt. From these men came trenchant social criticisms, new devices for data collection and analyses, and energetic surveys of school practice. They presided over the emergence of graduate study in education, notably at Teachers College of Columbia University, the University of Chicago, and Stanford University. They set the patterns for the State, city, and university research bureaus that sprang up across the country, and for the laboratory schools that grew up on the model of the Dewey venture at Chicago.

Joseph Mayer Rice is often credited as the founder of empirical scholarship in education. In a crude forerunner of today's National Assessment of Educational Progress, a large number of schools administered spelling tests of Rice's devising to some 16,000 students in the years 1895-1897. As Rice anticipated, the pupils' attainment on these tests bore no relation to the number of minutes per week their schools devoted to spelling. For his efforts, the principal investigator was subjected to almost unlimited attack.[6] Notwithstanding the vehemence of the attacks, Rice's exhortations to support a National Bureau of Educational Research and his efforts to create one under the auspices of the Forum Magazine also entitle him to be considered the father of the educational research bureau.[7]

Despite the criticism of Rice and his discovery that educators were unready to acknowledge hard facts, the situation soon changed. As

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[6] Leonard P. Ayres, "History and Present Status of Educational Measurements," in G.M. Whipple, (ed.), The Measurement of Educational Products, 17th Yearbook, National Society for the Study of Education, Part II, 1918, pp. 9-15.

[7] Sam D. Sieber and Paul F. Lazarsfeld, The Organization of Educational Research in the United States, ERIC Document 010 276, pp. 96-101.

Raymond Callahan has documented, the education community was coming to be dominated by business ideas. And while the excesses in the movement bordered on the absurd, quality was not ignored. Rice had demonstrated that applying an objective test uniformly in many schools is an effective way of stirring up educational debates. By 1918, Walter S. Monroe could describe over a hundred well-regarded standardized tests of pupil performance. Nonetheless, Callahan points out that while the businessman's interest in quality control was expected to contribute to school efficiency what the industrial engineer was contributing to industrial efficiency, efforts in this direction missed one of the major elements of the approach to "scientific" management, namely, the use of a planning department "to develop the science of the job, which involved the establishment of ... rules, laws, and formulas to replace the judgment of the individual workman."[8]

A major event in the launching of the new era of inquiry was the establishment in 1896 of John Dewey's Laboratory School at the University of Chicago. What was new about the laboratory school was the explicit intention of using it to test hypotheses in practice. While Dewey was a firm advocate of psychological research as a means of understanding education, he had no hope that psychological studies alone would show what schools should do.[9] His laboratory school was an attempt to work out practical techniques that others could emulate, in other words, a concern for development and demonstration.

At the time he established the school the methods for testing educational hypotheses were little developed. He founded the school as an act of faith, and the fact that a science of classroom experimentation failed to develop as a consequence of this bold move is very likely attributable to the success of his proposals. His ideas had wide appeal, and he was therefore deprived of the stubborn and articulate opposition that pushed men to collect solid evidence. Even so, however, the laboratory schools were limited in their impact because many educators believed they were too specialized and distinctive to serve as models for the majority of the Nation's schools. Their advantages in the form of well-equipped facilities, superior teachers, and selected pupils were so apparent that what they demonstrated seemed irrelevant to ordinary institutions.

Laboratory schools set up by universities in the wake of Dewey's success were vigorous for a time. Ultimately, however, many of them lost their internal validity. By 1938 such schools were often no more than a conventional private school benefitting the children of the university community.

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[8] Robert E. Callahan, Education and the Cult of Efficiency. Chicago: Phoenix, 1964, p. 35.

[9] John Dewey, "Criticisms Wise and Otherwise on Modern Child Study," Proceedings and Addresses, National Education Association, 1897, pp. 867-868.

During this period the U.S. Office of Education continued to sustain its information collection and dissemination function. A few major nationwide surveys were conducted of land grant colleges and universities, Negro higher education, secondary schools, teacher training institutions, and school finance.

During the period from 1895 to 1938 the school survey became the prime method of detecting aspects of school administration and curriculum in need of reform. The systematic gathering of formal data replaced the impressions of a single observer on which the typical survey previous to this time had relied.

Surveys became a feature of local school management as teams of professors and experienced administrators from other communities came in to review the local scene. They were commissioned by superintendents who desired guidance, by other superintendents who wanted to initiate change and required ammunition for their campaign, and by lay critics who suspected that their schools were in need of reform. Whatever the difficulties or deficiencies the surveys may have had, they carried an aura of irrefutable scientific authority. Many superintendents, determined to have the benefits on a continuing basis, set up research bureaus within their school systems.

Throughout this second period, inquiry was dominated by the empirical and the statistical. The analysis of the effects of instruction was a problem made to order for psychologists interested in applications of their new disciplines. History and philosophy, on the other hand, did not thrive in this atmosphere.

One manisfestation of the emergence of education as a self-consciously independent profession was the sharp separation of education and the arts and sciences that gradually developed in the years following 1905. Before that time, a fairly warm spirit of cooperation had marked the relation between academic scholars and professional educators. The rift that developed between the more pragmatically oriented educators and the more traditionally oriented academicians was a reflection of two larger social phenomena: the popularization of schooling and the professionalization of teaching.

For various reasons, academic specialists in the arts and sciences turned their attention away from the educational aspects of their field so that by 1940 the separation was nearly complete. There were exceptions, to be sure, but the professions of educational sociology, educational pyschology, educational philosophy, and educational history became separate from the main body of their disciplines.

Educational research and the training of educational researchers became a specialty of professors of education. Between 1897 and the 1920's the leading professors of education were recruited directly from the disciplines and remained leading figures in their academic fields. In the late 1920's the influential chairs began to fall to the students trained by the first generation of education professors.

Certainly one significant feature which altered the character of research training for education was the emphasis on breadth that often made it respectable for a single professor of education to serve as expert over the whole range of history, philosophy, sociology, and perhaps psychology as well. The students of these professors were more motivated toward benefitting people here and now, and this also altered the character of training efforts. The effect which this had on the training of researchers led T.R. McConnell in 1941 to restate a number of elementary propositions about research training.[10] Thorough knowledge of the relevant phases of the basic discipline, he insisted, was a prerequisite for any sound educational research. But by the time he was writing, few educational researchers qualified along such lines.

Research Assumes a Pragmatic, Action Orientation (1938-1954)

In part the shifting orientation of research can be laid to major factors external to the schools and education. In the Depression years, institutions straining every resource to pay their faculties could not afford to maintain research bureaus or to lighten teaching loads. During the war years and after, institutions straining to find enough teachers to cope with exploding enrollments were too busy to think about improving the quality of education. The post-1945 rise in clinical psychology, in mental health research, and in research on military training drew off many of the persons who in pre-war years would have become research workers in education.

But there were other reasons as well. The strength of the empiricism of the 1920's invited a negative reaction. The administration of standardized tests threatened both teachers and administrators through the fear of external comparisons of one class or school with another. Furthermore, with experience came a deeper understanding of the limitations of the research approach, limitations that restricted the significance of many findings.[11]

More important still, the leading professors of education by 1938 were espousing views antithetical to the earlier philosophy of research.

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[10] T.R. McConnell, "The Nature of Educational Research," in the Conceptual Structure of Educational Research. Supplementary Educational Monographs, No. 55. Chicago: University of Chicago, 1942.

[11] G.M. Whipple, (ed.), The Scientific Movement in Education. 37th Yearbook, National Society for the Study of Education, Part 2, 1938, esp. pp. 71, 89, 323 ff.

Between 1900 and 1930 research thinking was oriented towards standardization; the job of research was to establish conclusions that would apply everywhere. A new spirit of progressive education, which by 1938 predominated in the schools of education, stood in opposition to standardization. And, in the absence of standardization, it would be extremely difficult to do generalized research on the learning of any school subject.

Just as significant, the education writers of the 1930's adopted a considerably different posture with respect to American society than had the writers of the early 1900's. While the earlier writers had accepted the American social and economic system, the writers of the 1930's were bent on reshaping the society. Articulate education leaders attempted to formulate an educational program that would bring a better social order into being.[12]

Out of reaction and ferment came a new conception of research activity as an agent of change. The famous Eight-Year Study of the Progressive Education Association is an example. The study was initiated to determine whether subject matter requirements for college entrance, which seemed to limit efforts to modernize high school curricula, were in fact justified. The study was an unprecedented cooperative effort between 30 high school faculties and a large, well-led central "evaluation staff."

The main enterprise of the evaluation staff was to assist teachers in examining their own work and to encourage teachers in the experimental schools to explore new teaching and counseling procedures. But it is of no small significance that the data on student performance were used primarily by the teachers involved, rather than by administrators and school boards, and there was virtually no attempt to draw publishable conclusions from the data. In other words, as in Dewey's Laboratory School, there was an initial faith that the experimental schools were proceeding along the right line.

The social reformers and the progressive educators were essentially crusaders. Facts were occasionally gathered to demonstrate the need for a social change that had already been judged desirable in advance, or to monitor an operation so as to modify its details. "Action research" was a new kind of activity which absorbed at least as much professional effort as more conventional inquiry and attracted for more attention in the schools during this period. Guided by the Eight-Year Study and the pattern used by the late Kurt Lewin to alter housewives' food buying habits during World War II, persons seeking to change instruction set up projects in local schools under the leadership of visiting university professors. Cooperating teachers would identify some suspected inadequacy in their local program, collect facts by means of fairly unsophisticated instruments, plan some change on the basis of the facts, carry it out, and collect follow-up data. The goal was to change the practices of the teachers. In some settings and under particular leaders the studies were truly self-critical, decision-oriented inquiries that directly improved the local program; in other instances the entire activity was merely a method of manipulating teachers to move in certain approved directions.

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[12] John Dewey, "Progressive Education and the Science of Education," quoted by Martin S. Dworkin, (ed.), Dewey on Education, New York: Bureau of Publications, Teachers College, Columbia University, 1959, p. 119.

The Emergence of a Major Federal Role (1954-Present)

The events from 1954 are in large measure the events of the present. As such, of course, they are the very subject of this entire report.

In 1954 the 83d Congress passed the Cooperative Research Act authorizing the Commissioner of Education to enter into financial agreements with colleges, universities, and State education agencies for research, surveys, and demonstrations in the field of education. The same year the National Science Foundation provided its first support for course content improvement activities aimed at the improvement of mathematics and science instruction in the nation's elementary and secondary schools. The combination of these two events marks a major turning point for educational research and development in the United States.

The first beginnings of support for course content improvement activities from the National Science Foundation were authorized in fiscal year 1954. The first major award was made to the Physical Sciences Study Committee in calendar 1956.

The National Science Foundation's enabling legislation charges it with facilitating the improvement of education in the sciences. Immediately after the Foundation was organized, an investigation of the nature and status of science education in the United States was begun. The effort was designed to identify the most serious deficiencies and to see where the Foundation had (or could develop) the capability to help.

One of the discoveries was the gross inadequacy of the instructional materials available to teachers. Textbooks were found to be attractive, readable, but usually badly outdated in content. Many students were studying material already obsolete, unimportant, and in some cases frankly wrong. While the process of creeping obsolescence was of long standing, it became conspicuous and greatly accelerated by the explosive growth of knowledge after World War II. NSF's investigation disclosed that the gap between the content to textbooks generally and the current state of knowledge had become extraordinarily great.

Thus, the course content improvement activities of the National Science Foundation were begun.

The high school level was chosen first as the place to begin activities. It was the earliest level at which the several sciences are typically taught as discrete and separate subjects, and could thus be dealt with separately without a massive disturbance of the educational system. Second, it was the earliest educational level at which the Foundation felt the interest of competent scientists could be obtained, at least initially. Third, it was judged that secondary school activities would result in the most immediate effects on easing the student's transition to college. The Foundation, as a matter of policy, concentrated its support at the high school level for the first several years.

In more recent years, the Foundation has moved to the support of course content activities at the college level and the elementary grades. Recently, NSF has also begun to develop programs oriented to experimentation and use of computers in education and instruction.

The original legislation which set up the United States Office of Education has always been interpreted to include research as a major function. Under the leadership of Commissioner S.M. Brownell, the conviction that special legislation was necessary to authorize the U.S. O.E. to participate in extra-mural research found expression through the introduction and passage of the necessary legislation by the 83d Congress. The act was signed by President Eisenhower on July 26, 1954.

No support was provided under the Cooperative Research Act immediately following its passage. Commissioner Brownell, however, undertook special planning to insure that the program would begin in fiscal year 1957. In June, 1956, the Congress appropriated $1,020,190 under the Cooperative Research Act. Of this sum, $675,000 was earmarked by the Congress for research on the education of the mentally retarded.

The Cooperative Research Program was joined by two additional authorizations for research in 1958. Part of the National Defense Education Act, the new authorizations provided for research and demonstrations on the uses of new media for education and for foreign language studies.

New programs begun in 1961-62 under Cooperative Research authorizations provided support for curriculum improvement activities in English, language arts, and the social sciences. In 1963 two additional research authorizations were passed by the Congress. The first, signed into law in October of 1963, authorized support for research and demonstrations in the area of the education of handicapped children and youth. The second, signed into law in December, 1963, provided authorization for the support of research in vocational education. In fiscal year 1964 support was initiated under the Cooperative Research Act for the first research and development center.

In the spring of 1965 major revisions in the Cooperative Research Act were proposed and passed by the Congress. These amendments permitted the establishment of educational laboratories and development of training programs for educational researchers and related personnel, and authorized support for constructing and equipping major educational research and development facilities. One more education-related research authorization was signed into law as part of the Higher Education Act of 1965, directed to the support of research activities on libraries and information science.

The recent history of educational research and development requires special emphasis on the programs of the National Science Foundation and the U.S. Office of Education. External events, however, had a significant impact on funding levels. The spur to appropriations for both these programs was the educational concern which accompanied the shock of the Soviet space success in October, 1957. National Science Foundation allocations to course content improvement activities increased by nearly a factor of ten between Fiscal Years 1958 and 1959. Appropriations for research activities to the U.S. Office of Education nearly tripled during the same time span.

But activities in educational research and development were not exclusively lodged in NSF and USOE. The establishment of the Office of Economic Opportunity in 1964 added funds and some directedness to research efforts particularly for the disadvantaged, for early learning, and for vocational training. Other agencies, too, continued their efforts in education or related areas, notably the National Institute of Mental Health. The National Institute of Child Health and Human Development established by law in FY 1963 has led gradually to the provision of increased supported in education-related areas. The Department of Defense continues to play an increasing role.

This last, most recent, period of educational research history has been characterized by rapid growth, a proliferation of responsibility for the sponsorship of research and development activities, and a considerable expansion of the mechanisms available for carrying out and performing such activities. A more detailed accounting of the specific responsibilities and the present activities of these and other public and private agencies can be found in the chapters which follow.

Chapter IV

THE ORGANIZATION OF EDUCATIONAL RESEARCH IN THE UNITED STATES: SPONSORS

Sponsors for educational research and development include the Federal government, State and local education agencies, private foundations, industry and business, colleges and universities, and professional and academic associations. All of these agencies have varying conceptions of their missions as sponsors and carry out their functions in a correspondingly diverse manner.

Federal Government

Five agencies of the Federal Government have major responsibilities for the sponsorship of research and development activities relating to education. Another half dozen or so agencies sponsor smaller scale activities. Figure 1 indicates the several locations of responsibility for sponsoring education-related research and development in the Federal Government. Because of the greater responsibility for sponsorship in the Department of Health, Education, and Welfare, Figure 2 present a more detailed chart for this department.

The Federal sponsorship can be roughly divided into two principal categories. The first is comprised of the United States Office of Education, the Office of Economic Opportunity, and the National Science Foundation, which are charged with or have adopted educational research and development missions aimed at improving the practice of instruction or the educational process. The goals of these three agencies are directly related to the ongoing operation of American educational institutions.

The second category of Federal sponsorship embraces those programs indirectly related to the educational system. An agency like the Department of Defense does education-related research and development; however, the impact of these activities on the educational system is secondary to the impact on immediate Department of Defense requirements. Also included in this category are those which support research of relevance to education only as a by-product of other interests which are being pursued. Agencies such as the National Institute of

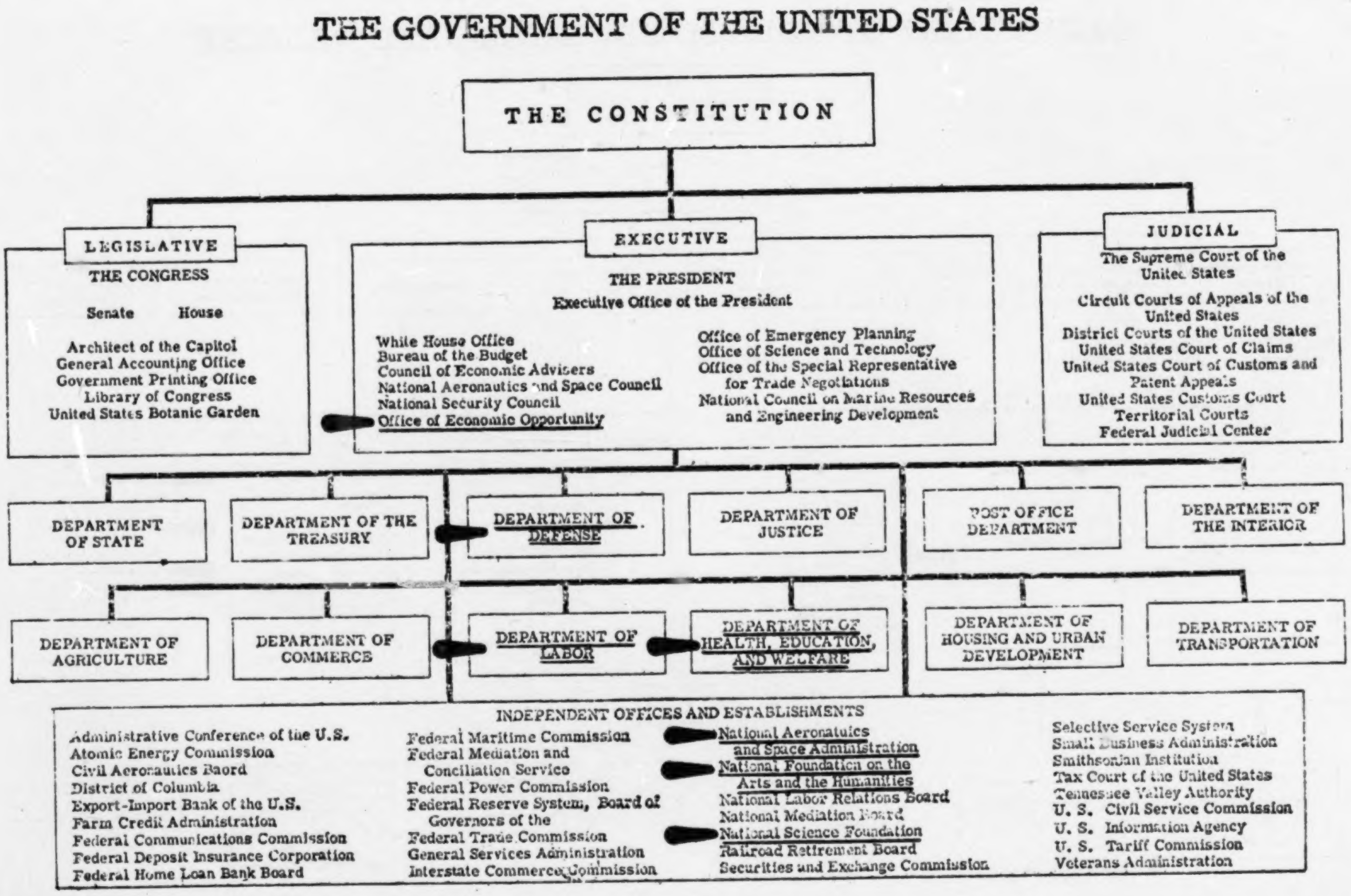
THE GOVERNMENT OF THE UNITED STATES
THE CONSTITUTION
LEGISLATIVE
THE CONGRESS
Senate
House
Architect of the Capitol
General Accounting Office
Government Printing Office
Library of Congress
United States Botanic Garden
EXECUTIVE
THE PRESIDENT
Executive Office of the President
White House Office
Bureau of the Budget
Council of Economic Advisers
National Aeronautics and Space Council
National Security Council
Office of Economic Opportunity
Office of Emergency Planning
Office of Science and Technology
Office of the Special Representative for Trade Negotiations
National Council on Marine Resources and Engineering Development
JUDICIAL
The Supreme Court of the United States
Circuit Courts of Appeals of the United States
District Courts of the United States
United States Court of Claims
United States Court of Customs and Patent Appeals
United States Customs Court
Territorial Courts
Federal Judicial Center
DEPARTMENT OF STATE
DEPARTMENT OF THE TREASURY
DEPARTMENT OF DEFENSE
DEPARTMENT OF JUSTICE
POST OFFICE DEPARTMENT
DEPARTMENT OF THE INTERIOR
DEPARTMENT OF AGRICULTURE
DEPARTMENT OF COMMERCE
DEPARTMENT OF LABOR
DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
DEPARTMENT OF TRANSPORTATION
INDEPENDENT OFFICES AND ESTABLISHMENTS
Administrative Conference of the U.S.
Atomic Energy Commission
Civil Aeronautics Baord
District of Columbia
Export-Import Bank of the U.S.
Farm Credit Administration
Federal Communications Commission
Federal Deposit Insurance Corporation
Federal Home Loan Bank Board
Federal Maritime Commission
Federal Mediation and Conciliation Service
Federal Power Commission
Federal Reserve System, Board of Governors of the
Federal Trade Commission
General Services Administration
Interstate Commerce Commission
National Aeronatuics and Space Administration
National Foundation on the Arts and the Humanities
National Labor Relations Board
National Mediation Board
National Science Foundation
Railroad Retirement Board
Securities and Exchange Commission
Selective Service System
Small Business Administration
Smithsonian Institution
Tax Court of the United States
Tennessee Valley Authority
U. S. Civil Service Commission
U. S. Information Agency
U. S. Tariff Commission
Veterans Administration

Figure 1. Location of Sponsorship for Educational or Education-Related Research and Development in the Federal Government

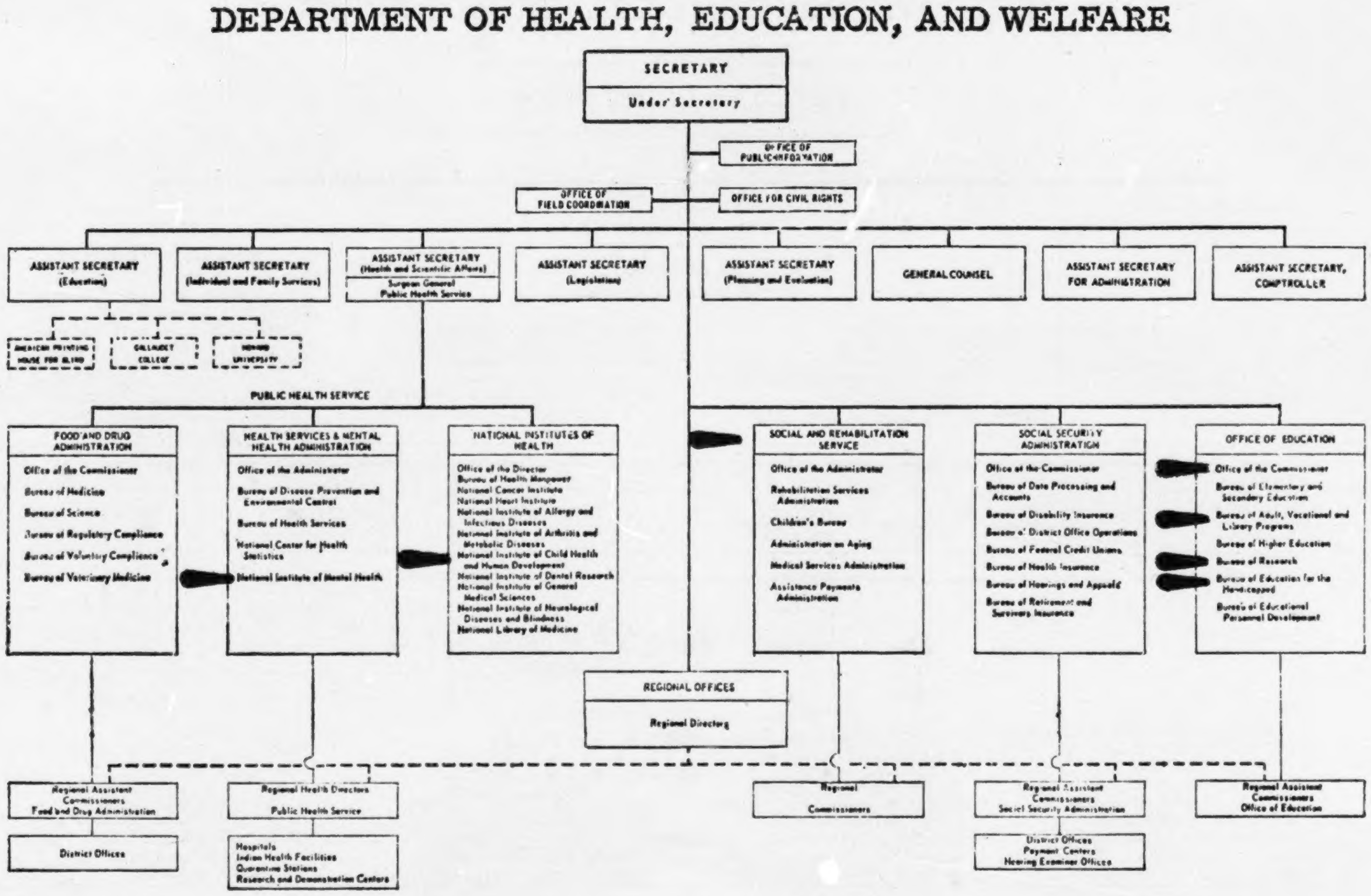
DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
SECRETARY
Under Secretary
OFFICE OF PUBLIC INFORMATION
OFFICE OF FIELD COORDINATION
OFFICE FOR CIVIL RIGHTS
ASSISTANT SECRETARY (Education)
ASSISTANT SECRETARY (Individual and Family Services)
ASSISTANT SECRETARY (Health and Scientific Affairs)
Surgeon General Public Health Service
ASSISTANT SECRETARY (Legislation)
ASSISTANT SECRETARY (Planning and Evaluation)
GENERAL COUNSEL
ASSISTANT SECRETARY FOR ADMINISTRATION
ASSISTANT SECRETARY, COMPTROLLER
AMERICAN PRINTING HOUSE FOR BLIND
GALLAUDET COLLEGE
HOWARD UNIVERSITY
PUBLIC HEALTH SERVICE
FOOD AND DRUG ADMINISTRATION
Office of the Commissioner
Bureau of Medicine
Bureau of Science
Bureau of Regulatory Compliance
Bureau of Voluntary Compliance
Bureau of Veterinary Medicine
HEALTH SERVICES & MENTAL HEALTH ADMINISTRATION
Office of the Administrator
Bureau of Disease Prevention and Environmental Control
Bureau of Health Services
National Center for Health Statistics
National Institute of Mental Health
NATIONAL INSTITUTES OF HEALTH
Office of the Director
Bureau of Health Manpower
National Cancer Institute
National Heart Institute
National Institute of Allergy and Infectious Diseases
National Institute of Arthritis and Metabolic Diseases
National Institute of Child Health and Human Development
National Institute of Dental Research
National Institute of General Medical Sciences
National Institute of Neurological Diseases and Blindness
National Library of Medicine
SOCIAL AND REHABILITATION SERVICE
Office of the Administrator
Rehabilitation Services Administration
Children's Bureau
Administration on Aging
Medical Services Administration
Assistance Payments Administration
SOCIAL SECURITY ADMINISTRATION
Office of the Commissioner
Bureau of Data Processing and Accounts
Bureau of Disability Insurance
Bureau of District Office Operations
Bureau of Federal Credit Unions
Bureau of Health Insurance
Bureau of Hearings and Appeals
Bureau of Retirement and Survivors Insurance
OFFICE OF EDUCATION
Office of the Commissioner
Bureau of Elementary and Secondary Education
Bureau of Adult, Vocational and Library Programs
Bureau of Higher Education
Bureau of Research
Bureau of Education for the Handicapped
Bureau of Educational Personnel Development
REGIONAL OFFICES
Regional Directors
Regional Assistant Commissioners Food and Drug Administration
District Offices
Regional Health Directors Public Health Service
Hospitals
Indian Health Facilities
Quarantine Stations
Research and Demonstration Centers
Regional Commissioners
Regional Assistant Commissioners Social Security Administration
District Offices
Payment Centers
Hearing Examiner Offices
Regional Assistant Commissioners Office of Education

Figure 2. Location of Sponsorship for Educational or Education-Related Research and Development in the Department of Health, Education, and Welfare

Mental Health, the National Institute of Child Health and Human Development, and the Social and Rehabilitation Service constitute examples of this second type of program.

United States Office of Education

Sponsorship by USOE of educational research and development activities is authorized in its enabling legislation and by six discrete legislative enactments.

The basic legislative authorization for research activities in the Office of Education is the fundamental statute creating USOE. Derived from original legislation passed in 1867, these statutes establish the Office of Education and authorize it to "collect statistics and facts showing the condition and progress of education in the several States and Territories ...." Under this authority, the Commissioner of Education has been empowered to conduct a variety of so-called intra-mural data collection activities using, until very recently, funds secured for normal, day-to-day operating expenses.

In addition to the fundamental legislation, six separate legislative enactments authorize the Commissioner of Education to engage in the support of research and development efforts outside the USOE. The first one enacted, and the largest in terms of financial support, is the Cooperative Research Act (Public Law 83-531 as amended by P.L. 89-10, 89-750, and 90-247.) Passed in 1954, first provided with financial support in Fiscal Year 1957, later amended in major ways by Title IV of the Elementary and Secondary Education Act of 1965, this legislation now authorizes the Commissioner of Education to support research, surveys, demonstrations, and the dissemination of information derived from educational research. The act also authorizes support for the training of researchers and related personnel, and for constructing and equipping educational research facilities. Under the terms of the legislation eligible applicants for funds include virtually any kind of organization, institution, or agency except a Federal agency, but transfers of funds to such Federal agencies are provided for nonetheless. This legislation is without limit in time, and appropriations authorized are of the size that the Congress approves.

Second in importance to the Cooperative Research Act in terms of appropriations is the research authorization directed to the education of handicapped children and youth. This is to be found in Titles III and V of the Mental Retardation Facilities and Community Mental Health Centers Construction Act of 1963 (Public Law 88-164 as amended by P.L. 85-926) which authorize the development of programs to support research, research training, surveys, demonstrations, related dissemination activities directed to the education of handicapped children, and construction and equipment expenditures for such research. The range of possible applicants for funds under this program is as broad as under the Cooperative Research Act. The program's authorization continues until June 30, 1970, and appropriations were authorized for $6 million in FY 1956, $9 million for FY 1967, $12 million for FY 1968, $14 million for FY 1969, and $18 million for FY 1970.[1]

Third in terms of appropriations is the authorization for support of vocational research under the Vocational Education Act of 1963 (Public Law 88-210 as amended by P.L. 90-576). This authorization has recently been amended; the new provisions will have the force of law on July 1, 1969. The current provisions authorize the Commissioner of Education, with 10 percent of the funds appropriated under Section 2 of the act, to support research, training, developmental, experimental or pilot programs designed to meet the special vocational needs of youth with particular reference to economically, socially, or academically handicapped young people.

The act's new provisions authorize the same range of research and related activities with the addition of dissemination and demonstration, but after July 1, 1969, the authorization will provide for distribution to the States, on a formula basis, of half of the monies appropriated for such purposes and reserve the other half of the funds to the Commissioner of Education to carry out research and related activities. Authorization continues through FY 1973 in the amount of 10 percent of $355 million in FY 1969, $565 million in FY 1970, $675 million in FY 1971 and again in FY 1972, and $565 million in FY 1973.[2]

Also under the terms of the amendments, the Commissioner may assist "State and local educational agencies in the development of curriculums for new and changing occupations and to coordinate improvements in, and dissemination of, existing curriculum materials." This authorization is for two years, FY 1969 and FY 1970, and is in the amounts of $7 and $10 millions respectively.

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[1] It is important to distinguish here between an authorization and an appropriation. Two steps are involved in establishing a new program in the Federal government. First, substantive legislation authorizing the creation of such a program must be passed. This legislation will usually specify the upper limits of the monies which may, during the life of the authorization, be appropriated to be expended under that authorization. (On occasion the authorization will be left open as to amount.) Then, before a program can become operational and each year thereafter, a separate piece of legislation must be passed actually appropriating funds for the program. This appropriation may not exceed the authorized amount, but it also does not necessarily have to equal it. In recent years, there have been considerable differences between authorized amounts for Federal education programs and the actual appropriations received under those authorizations.

[2] Appropriations requests for FY 1969 and FY 1970 did not equal the 10 percent provision, however.

A fourth piece of legislation, Title VI of the National Defense Education Act (Public Law 85-864), authorizes the Commissioner to support studies and surveys to meet the need for increased and improved instruction in modern foreign languages, to support research and develop materials which will constitute such improvements, and to support research and development in other fields related to improved understanding in area studies which are supportive of improved languages instruction. Unlike other authorizations for which USOE is responsible, this legislation permits the Commissioner to engage directly in these activities as well as to contract with outside agencies and institutions.

A fifth authorization for research activities in USOE is to be found in Title IIB of the Higher Education Act of 1965 (Public Law 89-329). Under the terms of Section 224 of Title IIB the Commissioner is authorized through FY 1971 to support research, demonstration, and dissemination projects relating to the improvement of libraries or the improvement of librarianship training, including the development of new techniques, systems, and equipment for processing, storing, and distributing information.

Finally, the Office of Education is also authorized, under the provisions of the Agricultural Trade Development and Assistance Act of 1954 (Public Law 83-480), to use a portion of United States' holdings of foreign currencies in certain countries abroad to support a wide range of educational research and related activities. Almost all of these funds are used under agreements with research organizations in the foreign countries themselves, but some may be U.S. applicants who plan to work in the countries involved.

In summary, the Office of Education is authorized under its basic statute to engage in data collection and statistical research activities designed to chart the progress of education in the Nation. In addition, discrete pieces of legislation empower USOE to support research and related activities in the general field of education, in the field of education for handicapped children and youth, in vocational education, in modern foreign languages and related fields, in library and information science, and in education generally in countries abroad where counterpart funds may be available.

Six organizational units in the Office of Education carry primary responsibilities for research and related activities. These organizational units are: (1) The Bureau of Research, (2) The Bureau of Education for the Handicapped, Division of Research, (3) The Bureau of Adult, Vocational and Library Programs, Division of Vocational and Technical Education, (4) The Institute of International Studies, Division of Foreign Studies, (5) The Office of Program Planning and Evaluation, and (6) The National Center for Educational Statistics. In all a total of seventeen units of division status or higher have major responsibilities. Figure 3 identifies these units and their relationships to one another.

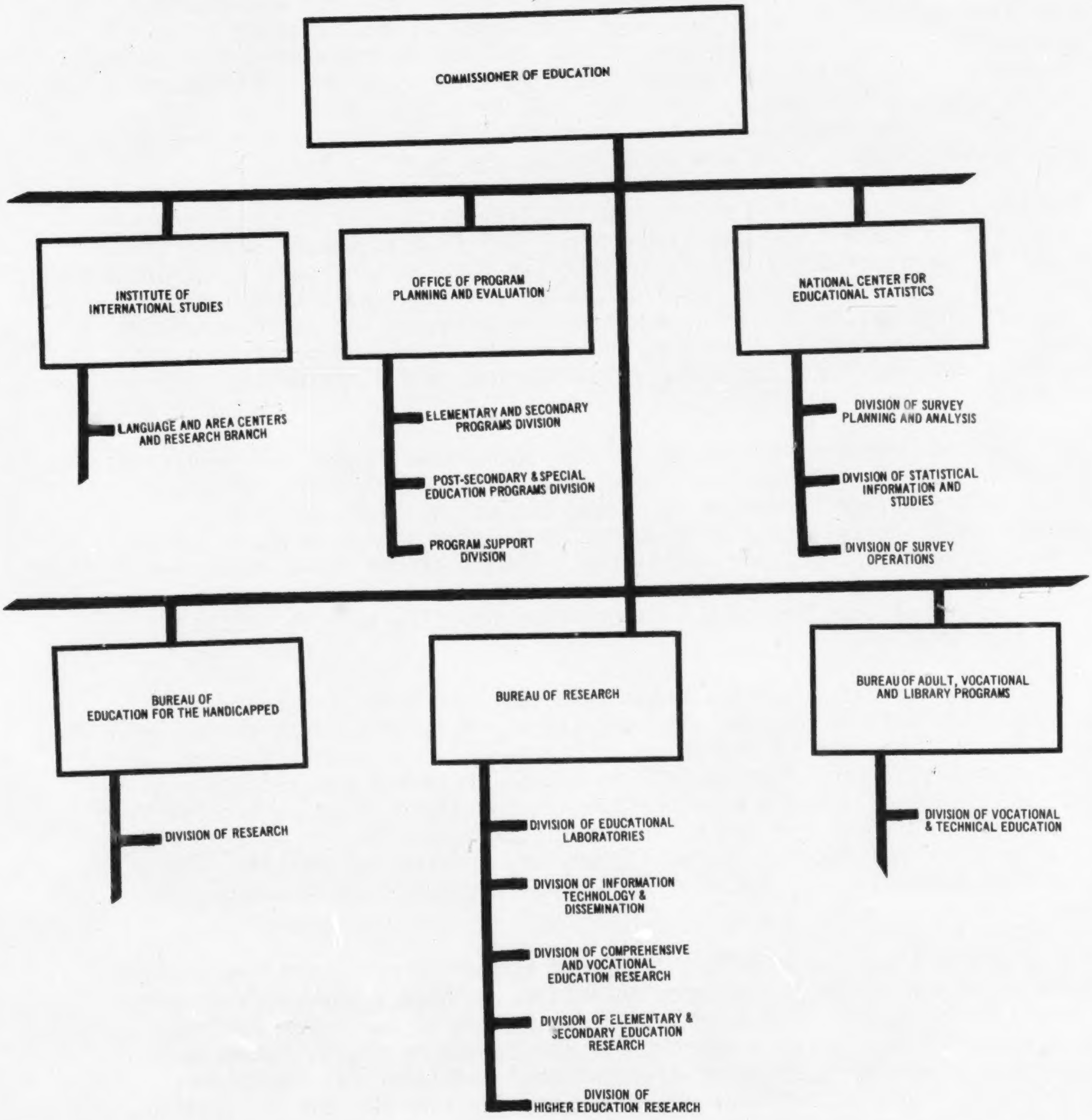
COMMISSIONER OF EDUCATION
INSTITUTE OF INTERNATIONAL STUDIES
LANGUAGE AND AREA CENTERS AND RESEARCH BRANCH
OFFICE OF PROGRAM PLANNING AND EVALUATION
ELEMENTARY AND SECONDARY PROGRAMS DIVISION
POST-SECONDARY & SPECIAL EDUCATION PROGRAMS DIVISION
PROGRAM SUPPORT DIVISION
NATIONAL CENTER FOR EDUCATIONAL STATISTICS
DIVISION OF SURVEY PLANNING AND ANALYSIS
DIVISION OF STATISTICAL INFORMATION AND STUDIES
DIVISION OF SURVEY OPERATIONS
BUREAU OF EDUCATION FOR THE HANDICAPPED
DIVISION OF RESEARCH
BUREAU OF RESEARCH
DIVISION OF EDUCATIONAL LABORATORIES
DIVISION OF INFORMATION TECHNOLOGY & DISSEMINATION
DIVISION OF COMPREHENSIVE AND VOCATIONAL EDUCATION RESEARCH
DIVISION OF ELEMENTARY & SECONDARY EDUCATION RESEARCH
DIVISION OF HIGHER EDUCATION RESEARCH
BUREAU OF ADULT, VOCATIONAL AND LIBRARY PROGRAMS
DIVISION OF VOCATIONAL & TECHNICAL EDUCATION

Figure 3. USOE Organization for Research

1. Bureau of Research

By far the largest portion of the responsibilities for sponsoring research and related activities through USOE rests in the Bureau of Research, created at the time of the major reorganization of USOE in July, 1965.

The range of potential responsibilities for the Bureau is large. All age levels, all levels of education, all curriculum areas, all research topics relevant to learning and education, and all the functions (research, development, surveys, demonstration, dissemination, and manpower development relating to all these) involved in employing science to improve education are within the scope of the Bureau's program. To carry out its responsibilities the Bureau is organized into five operating divisions. They are: (a) the Division of Elementary and Secondary Education Research (b) the Division of Higher Education Research; (c) the Division of Comprehensive and Vocational Education Research; (d) the Division of Educational Laboratories; and (e) the Division of Information Technology and Dissemination. There are also five staff offices which report to the Bureau chief.

The Bureau of Research is headed by an Associate Commissioner for Research whose responsibilities are delegated to him by the Commissioner of Education. They embrace the authorizations given to USOE under the provisions of the Cooperative Research Act, the Vocational Education Act of 1963, and Title IIB of the Higher Education Act of 1965 (library and information science research).

Five staff offices are responsible to the Associate Commissioner for Research. The Office of Management Services headed by the Executive Officer of the Bureau is responsible for (1) general administrative functions of the Bureau including personnel, travel, fiscal, and budget activities, (2) the operations of the Research Analysis and Allocation Staff which is responsible for logging in, routing, and keeping track of all proposals received by the Bureau, and (3) the operations of the Bureau of Research Information Control System (BRICS) Unit which operates the management information system of the Bureau.

The Program Planning and Evaluation Staff is responsible for developing systems for planning and evaluating the programs of the Bureau. In this capacity it is responsible for insuring that the Bureau meets the requirements of the Planning-Programming-Budgeting structure of the USOE and the Department of Health, Education and Welfare. Together with the Bureau's Executive Officer and his staff, the Program Planning and Evaluation Staff develops budget testimony and other materials. This staff also administers the two policy research centers supported by the Bureau and several research policy studies. Its total budget is $1.3 million in FY 1969.

An Office of Information and Publications superintends the public information requirements and press release activities of the Bureau and those publications activities which are independent of the larger dissemination responsibilities of the Bureau met through the operating divisions.

Two operating programs are administered at the Bureau level. The first of these is the Arts and Humanities Program, which is responsible for both research and development efforts and for a variety of office-wide program coordination activities for the Office of Education. The Arts and Humanities Program,oftentimes in close cooperation with the National Endowments for the Arts and Humanities, develops programs and activities which promote extension and improvement of education in the arts and humanities in the formal school system as well as in community art, music, theater, and dance groups and education programs conducted by museums, cultural centers, and State and local arts councils. The research budget for this program is $1.7 million in FY 1969.

The second operational program situated at the Bureau level is the Regional Research Program. It conducts a dual program of (1) small project research and (2) institutional research development grants, through the nine regional offices of the Department of Health, Education and Welfare. Research directors for each region administer the program within the nine regions. The Regional Research Program is the only Bureau of Research program administered through regional offices.

The purposes of the small project program are:

- To facilitate participation in educational research by faculty members of small institutions.
- To encourage small colleges to undertake research programs so that students may benefit from having professors who are engaged in educational research activities.
- To support significant, small-scale educational research projects.
- To provide for direct and expeditious handling of small-scale proposals.

Funds provided are not to be used primarily to prepare or publish a book, or to conduct meetings, conferences and seminars. Small project grants of the Regional Research Program are limited to $10,000.

The purpose of research development grants is to help colleges develop ongoing, self-sustaining educational research programs. Specifically, it is intended that these grants will:

- Make educational research an integral part of an institution's academic endeavors.
- Enable a greater number of faculty to pursue educational

research, and to engaged their students in the research process.

- Help institutions use research techniques and research findings to evaluate their programs and practices.
- Enable institutions to acquire and utilize information on completed and ongoing research as a basis for educational research development.
- Provide basic support for exploring and developing researchable problems in education.

Institutional research development grants are made to consortia of several colleges as well as to individual institutions. The FY 1969 budget for the Regional Research Program is $3.0 million.

a. Division of Elementary and Secondary Education Research

The Division of Elementary and Secondary Education Research administers project support for research and related activities of relevance to education at the preschool, elementary, and intermediate levels. More specifically, financial support is provided for basic studies related to these educational levels; for the development, evaluation, field testing, and demonstration of materials, methods, and instructional and support systems designed to improve educational and instructional practice; and for research and development related to the organization and administration of education at preschool, elementary and intermediate levels. The preservice and inservice education of administrative, instructional, and supporting staff for these levels constitute additional areas for research support. The operating budget for this Division in FY 1969 is $9.8 million.

A Basic Studies Branch provides project support for research that develops and refines the base of theoretical and empirical knowledge of relevance to education. Among the areas supported are those concerned with the learning process; the cognitive, affective, and sensory-motor dimensions of the learner; and sociological and cultural factors related to education.

An Instructional Materials and Practices Branch provides project support for the design, development, evaluation, and demonstration of total curriculums or segments thereof, appropriate for pupils at the preschool, elementary, or intermediate levels. Products of funded projects include curriculum guides, texts, programmed materials, audio-visual aids, teaching strategies, and instructional systems, and materials and procedures for the training of teachers and teacher aides.

An Organization and Administration Studies Branch stimulates, identifies, and provides project support for research, development, evaluation, and demonstration of materials and practices related to the organization and administration of preschool, elementary, and intermediate level programs, institutions, and systems. Research on pupil-personnel workers and services and the training of administrators for all jurisdictional levels (local, State and Federal) is supported through the activities of this Branch.

b. Division of Higher Education Research

The Division of Higher Education Research administers research and development projects applicable to all levels of post-secondary education, including graduate and professional fields. Its activities parallel those of the Division of Elementary-Secondary Research and are conducted through Basic Studies, Instructional Materials and Practices, and Organization and Administration Branches equivalent to those of the elementary-secondary division.

In addition, however, the division has responsibility for the research training mission of the Bureau of Research as authorized by the amended Cooperative Research Act. This mission is served by the Division's Research Training Branch through (1) a program of undergraduate, graduate, and post-graduate fellowship for the study of educational research, (2) institutional development grants to higher education institutions for developing and strengthening programs for the training of educational research personnel, and (3) the provision of project support for a variety of short term training programs. The operating budget for the entire division in FY 1969 is $9.5 million.

c. Division of Comprehensive and Vocational Education Research

The division provides support for research, experimental, pilot, demonstration and training projects under the research authorizations of the Vocational Education Act of 1963 as well as the Cooperative Research Act. The division's programs are directed to secondary (grades nine through 12) and post secondary (community or junior college only) levels. Adult and community educational programs as well as R&D on staff training for secondary and community college educational programs are additional areas of responsibility and interest for the division. Funding support is provided for basic educational research studies; development, evaluation and field testing of instructional materials and practices; organization and administration studies; and career opportunities projects. Diffusion of research findings and educational innovations is a major responsibility. The operating budget of the division in FY 1969 is $19.3 million.

Paralleling the divisions of elementary-secondary and higher education research, the Division of Comprehensive and Vocational Education Research operates through three Branches: Basic Studies; Instructional Materials and Practices; and Organization and Administration Studies. An additional branch, Career Opportunities Branch, supports research to enlarge the area of knowledge and generate descriptive and status information relating to the identification and development of careers in new and growing subprofessional fields. Improvement in labor market information needed for educational program planning, and the development of techniques to assess the economic effectiveness of education are areas of prime interest.

d. Division of Educational Laboratories

The division conducts two programs. The R&D Centers Branch supports nine university-based research and development centers and the National Laboratory for Early Childhood Education. The Laboratory Branch provides support for 20 regional educational laboratories established after the passage of the amendments to the Cooperative Research Act in 1965. The operating budget of the Division in FY 1969 is $64.0 million of which $29.6 million is for construction and equipment.

The Research and Development Centers Branch has responsibility for administering the research and development centers established under a program begun in 1963 under the Cooperative Research Act. The program grew out of concern that project research efforts had tended to be fragmentary and non-cumulative, that they had not succeeded in bridging the gap between research and practice, and that educational research had not succeeded in involving a broad enough array of disciplines outside of education. The Research and Development Center idea was conceived to remedy these concerns by permitting the gathering of a critical mass of interdisciplinary talent and other resources in a university setting to bear on a significant educational problem.

The branch administers the funds appropriated for the centers, a responsibility which involves establishing and carrying out procedures for evaluating the projects and programs of the centers. It conducts program analyses, and continually assesses the management capabilities to insure that centers fulfill their programmatic responsibilities.

The branch also administers the National Laboratory for Early Childhood Education, a distributed research and development center with a coordinating center and five member centers at universities and colleges in various parts of the Nation.

The Laboratory Branch is responsible for administering the funds which support the regional educational laboratories established after the passage of the 1965 amendments to the Cooperative Research Act. The central mission of the laboratory program is to speed the pace of intelligent application and widespread utilization of the results of educational research and development. In contrast to the R and D centers which conduct research on significant educational problems, individual laboratories create and demonstrate a rich array of tested alternatives to existing educational practice, building on the existing research base.

Responsibilities of the branch in regard to the laboratories are much like those performed by the Research and Development Centers Branch. Program analysis, management and program review, and coordination activities among laboratories and between the laboratories and other research and research-related activities play predominant roles. (Both the centers and the laboratories identified above will be described in greater detail later in the chapter on performers of educational research and development activities.)

The Division also has an Operations Staff which carries out the normal administrative activities of any division in the Bureau. It also bears special responsibility for assisting the two program branches in their contracting procedures of the centers and laboratories, and it administers the Research Facilities Program authorized under the provisions of the Cooperative Research Act.

e. Division of Information Technology and Dissemination

The division operates through four branches, each of which administers a distinct program. Total operating budget in FY 1969 is $8.3 million.

The Educational Resources Information Center Branch is the headquarters staff for the Educational Resources Information Center (ERIC) (described fully in the chapter on performers of educational research). The branch is responsible for developing, managing, and coordinating the ERIC system, a national information network for acquiring, abstracting, indexing, storing, retrieving and disseminating the most significant and timely educational research reports and program descriptions.

The Library and Information Sciences Research Branch administers the programs authorized under Title IIB of the Higher Education Act of 1965. It supports a considerable range of project efforts including (1) state-of-the art studies, (2) feasibility studies in both research and development, (3) prototype development, (4) the testing and evaluation of hypotheses or models in controlled settings, and (5) the demonstration and implementation of new techniques or procedures in noncontrolled settings to verify and,if necessary, modify the formulations developed. The branch also has responsibilities pertaining to research and development on the training of librarians and related personnel.

The Research Utilization Branch applies project support to encourage research on educational change and diffusion processes and to prepare interpretations of educational research and development which result in analytical and evaluative communications directed to specific target audiences. These reports are termed "targeted communication" and cover research in such topical areas as shared rural school services, bilingual education, and the use of paraprofessional teaching aides.

This program was established in FY 1969. Materials made available under the program will take a variety of forms including publications, filmstrips, films, instructional materials, games, and demonstrations. This branch is also responsible for administering the Educational Materials Center (now located at Federal City College), a repository for instructional material of all kinds.

The Equipment Development Branch is not yet fully operational. Its assigned mission, however, is the support of research and development of educational technology, especially the use of computers in education. The fact the branch is not fully operational reflects the newness of the field and the lack to date of relatively large financial resources which development of high-technology educational equipment will require. The bulk of the services rendered by the staff have been intramural.

2. Bureau of Education for the Handicapped, Division of Research

Outside the Bureau of Research, the largest extramural research program in USOE is the one directed to the education of handicapped children and youth.

The Bureau of Education for the Handicapped was inaugurated in January, 1967, as required by Public Law 89-750, which mandated a separate Bureau in USOE to deal with the problems of educating handicapped children. The Bureau inherited functions that had been previously performed by other organizational units in USOE (including the Bureau of Research), but was given a broader mandate and a larger budget.

The Bureau of Education for the Handicapped is clearly implementation oriented. The guidelines issued by the Bureau to applicants for research support state that the Bureau is "generally seeking solutions to pressing educational problems as they relate to handicapped children." The Bureau wants to support R&D activities which promise definable, early, and practicable results. The Division of Research is conceived as an operating arm of the Bureau. Its research support is aimed at delivering to the other divisions of the Bureau proven and operational educational techniques that can be put into practice.

The division has an operating budget in FY 1969 of $15 million and is organized into three branches, two of which are operational. The Projects and Program Research Branch is responsible for the research activities of the division. It administers the project research grants, research development grants, and the research and development centers supported by the handicapped children research program.

The Research Laboratories and Demonstration Branch is responsible for regional demonstrations, curriculum development and evaluation, conferences, and media project grants. A major activity of this branch is the management of the Instructional Materials Centers program (see next chapter). (The Curriculum and Media Branch has not been made operational.)

3. Bureau of Adult, Vocational and Library Programs, Division of Vocational and Technical Education

Research responsibilities of this division are two-fold. It participates on a policy committee to coordinate with the Division of Comprehensive and Vocational Education Research in the Bureau of Research the development of R&D programs authorized by the amended Vocational Education Act of 1963. This arrangement is designed to provide close liaison between the operating vocational programs of USOE and related research and development efforts.

The second set of responsibilities will not become operational until July, 1969. At that time administration of Part I of the Vocational Education Act, Curriculum Development in Vocational and Technical Education, will fall to this division. This responsibility will include providing appropriate assistance to State and local educational agencies in the development of curriculums for new and changing occupations, and coordinating improvements in, and dissemination of, existing curriculum materials. The division will be authorized to award grants and contracts to promote the development and dissemination of vocational education curricula, to develop standards for curriculum development in all occupational fields, to coordinate State efforts in the preparation of curriculum materials, to survey materials produced by other government agencies, to evaluate curriculum materials, and to train personnel in curriculum development.

4. Institute of International Studies, Division of Foreign Studies

The Institute of International Studies is currently in the process of carrying responsibility for the administration of the modern foreign language research authorization provided by Title VI of the National Defense Education Act. Responsibility for educational research activities in foreign countries under Public Law 83-480 (using foreign currency reserves) has also been transferred to the Institute as well.

5. Office of Program Planning and Evaluation

Primary responsibility for planning and evaluating the programs of the Office of Education rests in this office. Responsibility for educational research-related activities stems from the availability to this office of an amount of money (provided by a separate budget line under the Cooperative Research Act) to carry out evaluation studies of programs administered by the Office of Education. Some $700,000 was available in Fiscal Year Year 1968 and $1,250,000 in Fiscal Year 1969 for these kinds of activities. The plans for the expenditures of these funds are developed through a negotiation process involving the operating Bureaus of the Office. While the specific studies may be developed and monitored by evaluation staff in the operating Bureaus as well as by the two program divisions of the Office of Program Planning and Evaluation, primary responsibility for the funds rests with the Assistant Commissioner for Program Planning and Evaluation.

6. National Center for Educational Statistics (NCES)

The Center designs, directs, coordinates and executes all statistical programs of the Office of Education. It gathers, stores, analyzes, and disseminates statistical data and analytical studies to show the condition and progress of American education. The Center relates educational statistics to critical public issues and provides quantitative information for decision and policy makers at all levels of society.

Each of the Center's three divisions plays a particular role in the performance of these functions. The Division of Survey Planning and Analysis sponsors the systems of general educational statistics and special educational surveys of higher, elementary-secondary, and adult-vocational education, and library, museum, and educational television activities.

The Division of Survey Operations provides operational support for all NCES surveys and also provides sampling designs on an OE-wide basis. This division is responsible for developing and maintaining the master schedule for the total production of the Center.

The Division of Statistical Information and Studies performs statistical research and reference services. It performs both special and in-depth analyses of OE statistical data addressed to fundamental educational questions. It is responsible for examining the planning, operational, and research needs of users of educational statistics to assist in setting goals and policy for educational statistical programs. The development of standardized terminology and definitions to promote compatible reporting of educational data is also among its responsibilities.

The work of NCES is carried out by approximately 100 professional personnel supplemented by outside contracts. In Fiscal Year 1969 support for such contracts will be $500,000.

National Science Foundation

The National Science Foundation operates under the broad legislative authority provided by the National Science Foundation Act of 1950, Public Law 81-507, as amended. A wide range of activities is authorized, including support of basic scientific research in all science fields, fellowship awards in the sciences, international exchanges of scientists, and scientific information. Research and development activities in science education and science curricula are supported as a portion of the broader range of science-related activities administered by the Foundation. In addition, research support may be provided under its basic science grant system for research on learning or other areas relating to education. In recent months the Foundation has also acquired important responsibilities relating to the application of computer technology to education. Four organizational entities in the NSF bear responsibilities for education-related research and development activities.

1. Division of Pre-College Education in Science

This division encourages the development and production of high-quality teaching materials, including texts, supplementary readings, laboratory equipment, films, filmstrips, and other visual aids, and the necessary teacher guides to assure effective up-to-date instruction in the recognized fields of science and mathematics for students in the pre-college grades. The division carries out its responsibilities in this area by awarding grants to individuals and groups interested in these broad curricular questions, at colleges, universities, and curriculum commissions in all areas of science and mathematics. Operating budget for this division in FY 1969 is $5.0 million.

2. Division of Undergraduate Education in Science

The division supports much the same kind of activity as the one focussed on pre-college education. Differences arise from variations in the organization of undergraduate instruction, traditions relating to the responsibilities of individual instructors for course development at this level of education, and other similar kinds of factors. In the development of materials the division emphasizes the construction of modules that can be included in courses designed to meet the requirement of individual undergraduate institutions; while this same strategy is also followed at the pre-college level, the more frequent pattern there is the development of full-scale courses of instruction.

The division supports both individual project efforts and undergraduate curriculum commissions in such areas as agriculture and natural resources, biology, chemistry, physics, engineering, geography, geology, and mathematics. The FY 1969 operating budget of the division is $8.1million.

3. Office of Computing Activities

The Office of Computing Activities has responsibility for new programs designed to provide support of computer utilization in education and research. Support is provided for developing computer uses, for strengthening and expanding the area of study coming under the heading of computer sciences, and for student and teacher training. Support is also provided for special projects which may not fall under one of the above groupings.

The kinds of education R&D related activities which might receive support under this program include the development of computer-based curricula, research on innovative curriculum developments and techniques of computer-assisted instruction, the development of curricula and related material for the computer sciences, in short, a considerable range of activities related to the exploration, development and strengthening of the educational implications of computers. The operating budget of this office, not all of which goes to R&D type activity, is $17 million.

4. Division of Biological and Medical Sciences

The last organizational unit of the four in NSF which have responsibility for education and related R&D is the Division of Biological and Medical Sciences. This division awards grants in such areas as neurophysiological mechanisms in behavior, sensory, perceptual, and other complex processes, and animal behavior and ethnology, all of which would constitute important areas of fundamental research which might have bearing on a deepened understanding of the mechanisms of and conditions for learning.

Office of Economic Opportunity

More than any other major agency of the Federal Government, the educational R&D efforts of the Office of Economic Opportunity (OEO) are directed toward determining the best direction which operational programs of the various parts of OEO should take. OEO's R&D efforts are oriented directly to their operating programs and clearly directed to the solution of problems identified in the course of serving, through education, in the War on Poverty. In this respect, OEO is much like the Division of Research in USOE's Bureau of Education for the Handicapped, although serving different target populations.

The basic thrust of OEO's educational programs is toward "compensatory education." The population served by OEO is considered in one way or another to be socially, culturally, economically, or educationally deprived. Hence OEO is undertaking compensatory effort to overcome, or mitigate, the effects of such deprivation. Clearly, an important part of the compensatory effort is to provide educational opportunities which for one reason or another do not now exist in the present formal educational structures in the United States.

OEO's education programs come under six principal headings. These are:

Head Start
Follow Through
Upward Bound
Job Corps
Parent-Child Centers
Other Community Action Programs

Since these programs, with the exception of Follow Through, are directed to the support of activities generally outside of the existing structure of the education system and are generally supplementary to it, the research and development efforts supported have the same character.

Principal responsibility for research activities in OEO rests in its Division of Research, Plans, Programs, and Evaluation (RPP&E). This division, however, has only minimal funds of its own, and these funds -- about $2.5 to 3.0 million a year -- can be spent only for demographic surveys to ascertain the characteristics and locations of disadvantaged people. Other research and evaluation funds are drawn directly from funds allocated to the various OEO programs, e.g., Head Start, Follow Through, and Community Action Programs. RPP&E control over research and evaluation grows out of their responsibility for approving and actually allocating the educational R&D funds which are initially assigned to the operating programs.

RPP&E staff identify three types of evaluation, only one of which they are responsible for administering. These three are:

- Assessment of overall program impact (RPP&E responsibility)
- Evaluation of alternative program strategies (Operating program responsibility)
- Monitoring evaluation of individual project activities (Operating program responsibility)

The administrative arrangement for approval of R&D activities creates a fair amount of conversation between operating programs and RPP&E staff which generally results in more highly refined and sharply targeted efforts. The total OEO R&D effort in FY 1969 amounts to $14.3 million. This is allocated in the following way:

Head Start	
Research and Demonstration	$4.1 million
Evaluation	$1.9 million
Follow Through	
Research and Demonstration	2.5 million
Evaluation	1.8 million
Community Action Programs	
Research and Demonstration	4.0 million
Total	$14.3 million

National Institute of Mental Health (NIMH)

The basic mission of NIMH is to develop knowledge, manpower and services to treat and rehabilitate the mentally ill, to prevent mental illness, and to promote and sustain mental health. The particular character of this broad charge assures a significant role for the Institute in the support of education-related research and development activities. Research is supported through a broad grants program.

The Division of Extramural Research Programs handles the greater bulk of the activities which NIMH supports that relate to education.

The Division's Behavioral Sciences Research Branch supports a variety of studies which may have relevance for education, in such areas as learning; motivation; cognitive processes; personality development; and the social sciences in relation to mental health including socialization processes, family structure, and culture and personality. The Division's Applied Research Branch provides support for an extensive program of research on mental health related to education on such topics as: learning problems of children, especially the emotionally disturbed and retarded; school adjustment disturbances; under-achievement; dropouts; student stress and group reactions, particularly at the college level; ecology of school situations; and school mental health services. The operating budgets for the Behavioral Sciences Branch and the Applied Research Branch identified above are $19.1 and $17.8 million, respectively.

National Institute of Child Health and Human Development (NICHD)

This is the second youngest Institute in the National Institutes of Health (NIH) complex. It was established in 1963 under the terms of Public Law 87-838. Its mission is a broad one: to help individuals achieve a normal healthy life from conception to death. One of its publications states that "through the conduct and support of research and training in the biological, medical, behavioral and social sciences, this Institute fosters efforts for acquiring new knowledge and deeper insight into the health problems and requirements of mothers and children, and into the process of human life and development of all individuals throughout their life span."

Except for a relatively small amount of funds needed to cover administrative costs and to support new in-house (intramural) research projects, the Institute's funds are used to support outside research and training projects and programs in five categorical fields: Reproduction and Population Research; Perinatal Biology and Infant Mortality; Growth and Development; Adult Development and Aging; and Mental Retardation.

The Institute has strong interest in directing a substantial fraction of its resources to projects in education-related research and development. It views "learning" as embracing the individual's entire environment and being relevant to his entire life span. A statement made before the President's Science Advisory Committee pointed out that the Institute's basic mission was "to foster, conduct, and support research and training in the processes of human development--which includes the learning processes."

The statement went on to say that NICHD was not primarily involved in what it considered to be the traditional kind of educational research. "Rather, the Institute is concerned with unravelling those basic biogenetic and environmental processes by which individuals not only successfully adapt to societal demands, but also achieve the higher forms of cognitive learning and abstract reasoning."

The kinds of education-related research which the Institute supports under its five extramural programs and in its intramural (in-house) research include the physiology and bio-chemical processes of fetal growth; developmental behavioral and cognitive processes; effects of impoverishment on intellectual functions; the effects of malnutrition on mental development; language development, speech, and dyslexia; personality development; neurophysiological aspects of learning; specific mental processes such as perception, attention, sensory processes, and memory; developmental aspects of intellectual capacities as these relate to age, race, and socio-economic status; the role of motivation, affect, social conditioning, incentives, and cognitive style on normal and mentally retarded persons, and the prevention of the occurrence of retardation. Organization of the structure is analogous to that described for NIMH.

Sponsorship by Other Federal Agencies

The five agencies described above (USOE, NSF, OEO, NIMH and NICHD) together provide the vast majority of the Federal funds available for educational research and development activities in the United States. A number of other Federal agencies, however, do provide some measure of support and should be mentioned here.

Of these additional agencies, the Department of Defense provides the largest portion. No single program is directly aimed at educational research, of course. But incidental to a number of missions the Department of Defense is called upon to support, funds are made available for research on various aspects of learning and motivation, for the development of training materials of more than simply military significance, and for exploration and development of computer uses for instruction and training.

Other agencies which sponsor educational or related research and development include the Children's Bureau and the Social and Rehabilitation Service of the Department of Health,Education,and Welfare, the Department of Labor, the Department of Agriculture, the National Aeronautics and Space Administration, and the National Endowments for the Arts and Humanities. None of the agencies identified above has programs geared specifically to the support of work in the areas of this study's interest. All of them, however, do in fact provide support for research and development work which, while secondary to their missions, and small in relation to the five major agencies, can be considered of importance to education and learning.

State Governments

State sponsorship of educational research and development is characterized by a great degree of variability as to function, organizational expression, and sources and amounts of financial support.[3] As of 1965 research units or persons whose primary responsibility was research were found in 37 States. The location of the research unit in State departmental structures illustrates the department-wide nature of the research needs and services of these units.

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[3] Material for this section was drawn from a publication by John E. Bean, Research in State Departments of Education (U.S. Government Printing Office, Washington: 1965). The survey was based on questionnaires returned in the spring of 1964. Since substantial activities have occurred in State departments of education, owing particularly to the passage of the Elementary and Secondary Education Act of 1965 with its provisions for strengthening State educational agencies and for requesting evaluations of the Federal programs which comprised the Act, the picture is unquestionably altered by this time. For the purposes of this study, however, the data in

In most States the role of the State department of education is defined in the State constitution and subsequent legislative enactments, with facilitating arrangements and activities left to the State board of education and departmental staff. In some States the legislatures have established identifiable funds for educational improvement activities. Other States require their commissioners of education to establish and maintain adequate statistical and financial records and to provide for a continuous research program to aid in the betterment of the public school system under their charge. Some legislatures have passed laws and appropriated funds to support research in specified areas, for example, on gifted or emotionally disturbed children, or to support studies of differentiated salary arrangements based on merit.

As of 1965, regular legislative appropriations were designated for research activities in 12 States in the total amount of $3.5 million.[4] NSF reported that State educational agency expenditures in FY 1965 on R&D were $5.9 million.[5] State support of educational research was by no means limited to those States where research funds were expressly designated by legislative action. In some States the regular research budget is covered by a line-item in a lump sum departmental appropriation. Rather than receiving an explicit appropriation California maintains a bureau of educational research in the State department of education with a staff of over 35 people; research expenses in New Jersey were charged to an account known simply as the "Commissioner's Office."

In some States, research programs in particular areas have been initiated in response to legislative mandates, and then later broadened from specific to general and routine support of research. In sum, although comparable figures are difficult to obtain, almost all States support educational research in some degree.

Some States even administer grants programs in support of research and experimentation. The regular New York State departmental grant program is the most comprehensive of these administered by the States. Other States with established grant programs in 1965 included California,

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the Bean study constitute at least a minimum portrait of what State agencies are doing. With that understanding we have used the data from the 1965 report. (Partly as a result of the inadequacies of our information about research activities in the States uncovered as the work for the present study were pursued, plans are now being implemented to use FY 1969 Cooperative Research funds to re-survey provisions for research and related activities at the State level.)

[4] Bean, op. cit. p. 21

[5] R&D Activity in State Government Agencies, Fiscal Years 1964 and 1965. Washington: U.S. Government Printing Office, 1967, p. 31.

Georgia, Utah, Virginia, and Washington. Most of the proposals submitted to these States are directly concerned with school operations: administration, curriculum, instruction, and special programs.

State departments of education not only have responsibilities for direct sponsorship of educational research activities, but in many cases provide leadership in the coordination of educational research for programs under their jurisdiction. Departmental research divisions in the States function in a service capacity to the department as a whole. They may also play important roles in sponsoring or cooperating with State educational research councils, school study councils, or other governmental or independent organizations involved in stimulating and otherwise encouraging educational research activities.

Finally, States will assume important new research responsibilities when the new provisions of the vocational research authorization are implemented through the passage of appropriations. Under the terms of the amendments of 1968 to the Vocational Education Act of 1963 the States are to receive half of the funds appropriated for research activities for direct administration.

Services performed by the several States in regard to educational research include consultant services in research for departmental staff members and local school district personnel. The amount of such service varies considerably, of course, among the States. In a few States the department staff screens and endorses all research projects involving the public schools. In several States, the department of education utilizes the services of university research specialists in providing such consultant assistance to the department and local school districts. In 1965 four States reported that they maintained extraordinary departmental activities for graduate students interested in undertaking research projects of one kind or another. Some States have even compiled a list of suggested topics for graduate students.

Other States have provided inservice training in research techniques, established internship programs for the training of educational researchers, or conducted research seminars.

Private Foundations

Over the years the philanthropic foundations represented by such names as the Ford Foundation, the Ford-supported Fund for the Advancement of Education, the Carnegie Corporation, the Kettering Foundation, the Danforth Foundation, the Hill Family Foundation, and the Sloan Foundation, have been an important locus of sponsorship for educational research and development activities. Carnegie, Ford, the Fund for the Advancement of Education, and Kettering have been the most active in this regard in terms of total dollar support.

In interviews and surveys conducted for the purpose of this study no case was found in which a major foundation specifies educational R&D as such among its stated areas of interest. Substantial support for educational R&D is given, however, by foundations under broader classifications of interest such as the Ford Foundation's program to aid education or the Rockefeller Foundation's program in support of equality in society at large.

Three examples of Foundation sponsorship of education research and development activities are presented below. They are illustrative of the roles that the larger foundations have played in this area.

Ford Foundation

The Ford Foundation's activities in educational research and development operate out of a mandate from the Foundation's Board of Trustees to support the general area of education. The Foundation supports educational research as well as other projects which are related to the issues identified in the guidelines prepared by the staff in the Education Division.

Program areas identified for the next few years include:

- New dimensions of problems in inner city schools
- Educational problems in areas of the developed world
- Pre-school and elementary education problems
- Emphasis on speeding up acquisition of the Ph.D. in the social sciences

The Foundation does attempt to be open to consideration of projects that do not fit clearly into the issues and guidelines out of which it operates and they reserve a portion of their funds specifically for that purpose.

The annual budget for the Education Division of Ford is approximately $25 million; perhaps $5 million of this would come under the heading of educational R&D.

The Foundation attempts to have their three "program officers-in-charge" identified by their specialized clientele as the contact points for the Foundation. Program officers and their staffs have the authority to turn down requests or to work with proposals that they feel have promise and are related to the Foundation's guidelines in education.

Carnegie Corporation

By charter the mission of the Carnegie Corporation of New York is that of education; projects they support either deal with problems relating to education or utilize education as a means for the solution of other problems.

Currently the major areas of Corporation interest are:

- Higher education
- Education in arts and medicine
- Public affairs
- Pre-school education
- Learning theory

Areas of interest of the Corporation are largely determined by the particular interests and competencies of the eight senior professional staff members of the Corporation. While educational R&D is not specifically identified as an area of interest, research and development type activities may be supported in any of these areas.

Within its broad education charter, the Carnegie Corporation operates a rather flexible, informal organization. It provides grants primarily for direct action and experimental and demonstration projects. Very few basic research projects are supported directly, although they may be supported as part of broader efforts or by people receiving Carnegie Fellowship support provided through various professional groups. The Corporation occasionally funds longer-range programs (an example would be the Kerr Commission's activities in the field of higher education), but it normally provides grants for projects where specific results can be more easily seen.

Charles F. Kettering Foundation

The Kettering Foundation, following an assessment of their educational grants in 1964, decided to institutionalize the application, dissemination, and implementation of the results of both foundation-supported and other educational research. As a consequence of this decision and a considerable amount of staff work, the Foundation became an operating as well as a grant-making organization in the field of education through the establishment of the Institute for the Development of Educational Activities (IDEA). IDEA was first a division of the Foundation and later an incorporated subsidiary.

IDEA is evolving into a service agency which attempts to help bring about the adoption of innovative practices in U.S. public schools.

Three areas of current focus are:

- Early childhood
- Elementary education
- Secondary education

IDEA is attempting to develop expertise within these areas on those innovations that might have the greatest impact on the total educational program of a school district.

The Institute is composed of three semi-autonomous divisions: Research and Development; Innovative Programs; and Informational Services.

The Research and Development Division is primarily engaged in surveying the state-of-the-art of educational change and conducting some longitudinal experiments on the implementation of new ideas in several cooperating demonstration schools. The division does not conduct basic research, but does attempt to identify some of the gaps in research related to innovation. Some 50 percent of IDEA's staff is employed in this division.

The Innovative Programs Division attempts to utilize some of the findings of the R&D Division as well as ideas, judgments and findings produced elsewhere in developing expertise available on request to school districts and others interested in educational change. The division maintains its own competent staff on specifications for educational facilities (the area of its primary focus) and serves as an organizing and integrating force to bring to bear the resources of a "core of consultants" on all of the educational problems of a particular school district. Through the core of consultants, IDEA can help a school district to mount a coordinated and integrated revision of its entire program. The Institute is making some attempt to multiply its effects by working with architects and state education agencies who in turn might effect change in a larger number of school systems. The cost of the consultation service is borne by the school districts themselves while the Foundation underwrites the operating and staff costs of the Institute.

The Information Service Division develops all materials for the Foundation, including reports of seminars and conference, working papers supported by the Foundation as background for the implementation of certain innovations, and a microfiche library of the elementary science, reading, and social studies curricula. The division also develops material for informing the lay public on the feasibility of changes in education, and for the inservice training of teachers and administrators. Not all of the efforts of the Information Services Division bear directly on the activities of the other two divisions.

Smaller Foundations

To round out the picture of foundation sponsorship of educational research and development, six smaller organizations were identified as having a known interest in education and were contacted by mail and studied through documents such as annual reports. These six are:

The Commonwealth Fund
The Danforth Foundation
Esso Education Foundation
The Grant Foundation
Louis W. and Maud Hill Family Foundation
The Mott Foundation

The involvement of these six foundations in the field of education varies greatly in both extent and nature. The Esso and Hill Foundations are the only two that identify educational research and development as an area of interest and specify procedures for its support. (Esso actually provides grants and reports projects under an Educational Research and Development category.) However, the other four foundations support at least some R&D types of activities as means for carrying out their major foci in education.

The Commonwealth Fund is primarily interested in medicine and the delivery of health services. Educationally, they are interested in developing new curricula for medical education. The Fund states no restrictions on the types of grants that it will consider; i.e., the Annual Report indicates that some grants are provided for operating and building funds. The Commonwealth Fund granted a total of 7.6 million dollars in 1968; 6.7 million of which was devoted to medical education and community health. It is not possible to determine from the Annual Report the proportion going to educational research and development, but the National Board of Medical Examiners was given $300,000 to study educational testing and measurement.

The field of education has long been the major interest of the Danforth Foundation. It supports R&D activities in line with its areas of interest. For example, it recently supported a study of the future role of private colleges and universities. The Foundation recently identified urban problems as an area for major emphasis and it will support educational activities related to this area.

The Danforth Foundation is both an operating and grant-making foundation. Approximately one-third of its budget goes into its own administration of such things as fellowships, grants to individuals, and workshops. Areas of education listed as being outside of the Foundation's interest are: adult education, elementary and pre-school education, and informal education programs. Also, support is not provided for salaries, operating expenses, and building. The Danforth Foundation granted a total of $6,984,000 in 1967-68, but only $617,000 (or less than 10 percent) of this payment was made on grants approved during that year. It is impossible to decipher specifically the research and development grants from this total operation. The Foundation's operating program cost was $3,780,000 during the 1967-68 fiscal year.

The Esso Foundation's primary interest is the support of institutions of higher learning. It not only provides specific funds for educational research and development within this area of interest, but also provides support for innovative projects in undergraduate education through a program called Support for Promoting the Utilization of Resources (SPUR). Grants under this program are limited to $75,000 per project. The Foundation was founded by and received 85 percent of its annual income from the Standard Oil Company of New Jersey and its affiliates. The Esso Foundation provided $512,000 in 1967-68 to 21 different grantees for educational research and development, and in the previous year provided $424,000 to 30 different grantees.

The major interest of the Grant Foundation is the mental health of children. As a part of this interest, a significant portion of their grant-making activity (approximately 40 percent in fiscal 1967) was directed at the psychological aspects of education--one of their reporting categories. During fiscal 1967 the Grant Foundation appropriated $2,826,174 of which $1,122,700 was granted for projects in the psychological aspects of education. The staff indicated that approximately $500,000 is granted each year for projects that could be classified as educational R&D.

The Hill Foundation is interested in science, welfare, and all levels of education. Many of its projects classified as scientific or welfare are educational in nature. It has long been interested in basic research, but is now giving increasing emphasis to applied research and experimentation. The Foundation attempts to identify problem areas and support projects in the northwestern portion of the United States. During the 1967-68 fiscal year, the Hill Foundation granted a total of $2,720,000 out of which some $295,000 (according to their estimates) might be considered research and development.

The basic area of interest of the Mott Foundation is the development and promotion of the community school concept. Their efforts in this area are primarily focused on using the community school system in Flint, Michigan, as an arena for innovative solutions to problems arising in that area of concern. The Foundation does support university fellowships and regional centers at seven universities where some of the lessons learned from the Flint experience can be disseminated. Most of the Foundation's grants are for the operation of programs; those in Flint are administered through the Mott program of the Flint Board of Education.

Sponsorship by Private Industry

The role of private industry in educational research and development has proven very difficult to ascertain.[6] This is so for several reasons. The companies range from publishing organizations to producers of non-book materials to corporate giants such as Xerox, Ratheon, International Business Machines, and Litton Industries. They differ greatly in their operational definitions of research and development. Further complicating the matter, research and development activities may occur at many different points within an organization, and company budgets are often not broken down by functional categories like research and development.

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[6] The cooperation and assistance of the Institute for Educational Development (New York) and Dr. Nancy Bord of their staff is gratefully acknowledged for the opportunity to assess materials currently under preparation by them in connection with a study of research and development in the education products industries.

The publishing industry by itself appears to be in general agreement that what constitutes research and development in the publication of textbooks is not the same kind of activity found in technologically oriented corporations. Furthermore, even within the publishing industry variability in definition can be found depending on the kinds of materials produced. For the production of college materials, for example, the reputation of the author seems to be more important than whether the company itself has done any research in the area or has actually tested materials in classrooms.

For elementary and secondary text preparation, however, the picture becomes even more complicated. The proposed subject matter of the text appears to be an important variable in considering whether to do any research on the grounds that learnings in some areas are easier to test than in others. On the other hand, for the production of standardized tests, highly structured and sophisticated psychometric models for research, testing, and validation of materials were found to exist.

A second group of corporations, producers of non-print materials, sponsor activities that are primarily of a market research variety. Basically, they attempt to produce what they think they can sell to schools and professionals. There are exceptions to this rule, of course. Companies can be found with highly sophisticated models of research and development and specific examples of activities conforming to their models. Generally speaking, however, the non-print producers tend to see themselves as educational suppliers, and their research activities focus fairly sharply on the kinds of studies which pinpoint professional demands which they can then supply.

Finally, the corporate giants constitute a group which possess the most highly refined conceptual understanding of research and development. Even so, considerable variation of view can be found across the companies and within companies at different levels of organization (particularly in the case of recently acquired subsidiaries).

A wide range of variation exists in the types of research and development activities sponsored by the corporate giants. The computer and copying machine manufacturers commit substantial resources (although exactly how much has proven impossible to ascertain) to materials and equipment development. Corporations in mass communications seem less likely to do as much research directly relevant to materials production or to the field-test and evaluation of products.

Sponsorship by Institutions of Higher Education

The primary role of colleges and universities in regard to educational research and development is mainly that of performer (see the next chapter), but as sponsors, they perform some roles. These should at least be mentioned.

Many college and university departments or graduate schools have available to them research funds derived from endowment or general institutional funds which can be used to support faculty research activities. Sometimes these are allocated in the form of released time for self-supported research activities. In many instances there are also funds to be used to purchase the services of research assistants and computer time, or to otherwise make available resources, besides principal investigator time, necessary to carry out research tasks. Mechanisms for awarding such support are very much similar to mechanisms for approving externally supported faculty research and are reviewed later.

Other Sponsors

In addition to Federal agencies, State departments of education, private foundations, private industry, and colleges and universities (local agencies are almost exclusively performers of various types of research and evaluation activities and are therefore discussed later) there are several other types of organizations which play a role close to that of sponsorship. Reference is made here to associations representing academic disciplines and professional associations of educational researchers.

One of the principal professional organizations is the American Educational Research Association headquartered in Washington, D.C. Until recently affiliated with the National Education Association, this organization of professional researchers and interested educators has grown in size and influence in recent years. From a membership of 3,000 in 1964, the AERA has by 1969 become an association of 6,000 active members out of a total membership of 8,500. About 70 percent hold the Ph.D., and 60 percent of these have earned the degree since 1961. A survey taken by AERA staff in 1967 indicated that 30 percent of the members surveyed had received a grant for research or development from their institution or from an outside source during that year. The majority of the membership consider themselves specialists in a branch of education; this remains the largest category even if educational psychology, the next largest group, is factored out. The third largest group consider themselves to be psychologists other than educational psychologists.

With its rapid growth have come changes in the character of the membership of the association. The percentage of individuals with school affiliations has remained relatively constant, but the prior characteristic of these members as generalists, such as the assistant superintendent for instruction or curriculum coordinator, is giving way to specialists in research and evaluation. The importance of profit and non-profit research corporations is apparent as shown by the affiliation of a growing number of the members and contributers of papers at the annual meeting. Sociologists are not numerous in the association, but recently a new division was created dealing with the

"Social Context of Education" which may be symptomatic of growing interest in this area on the part of association members. Another group which has had until recently minimal contact with the association is that represented by the curricular reformers engaged in National Science Foundation mathematics and natural science curriculum innovation. As these projects in recent years have employed more behavioral scientists their contact with AERA has noticeably increased.

In addition to AERA there are other groups who perform similar sponsorship roles in the field of educational research and development. For example, the National Society of Programmed Instruction consists largely of psychologists, trainers in government, military, and industry, and industrial engineers. Test and measurement specialists who are responsible for testing programs at universities and colleges and specialists in finance at these institutions have banded together to establish the Association for Institutional Research.

Curriculum-oriented researchers have formed such groups as the National Association of Researchers in Science Teaching (membership: 600), the National Association of Researchers in English, and the International Reading Association.

Other more generally or discipline oriented associations have also played important roles. The National Education Association, for example, maintains a Research Division of considerable size, whose activities are described in the next chapter. The American Psychological Association, the American Sociological Association, and the Association of American Anthropoligists have all played important sponsoring and stimulation roles relating to the utilization of the research talent in their respective organizations.

A new organization of some interest in the sponsorship of educational research and development goes under the name Project ARISTOTLE (Annual Review and Information Symposium on the Technology of Training, Learning, and Education). The genesis of ARISTOTLE lies in the long relationship between the Department of Defense and the National Security Industrial Association (NSIA). In order to stimulate both thought and action regarding the application of new technology and the discipline of systems analysis to problems of learning, teaching, training, and education, a conference was called under the sponsorship of the Department of Defense, the NSIA, the Department of Labor, and the Office of Education. Project ARISTOTLE is providing a setting for interaction between education and industry within the framework of ten Task Groups working on such categories as educational research, systems approaches to education, government-education-industry interface, media, and the like.

Committee on Basic Research in Education (COBRE)

Finally, one additional sponsoring organization is worthy of mention. At the request of the USOE, the National Academy of Sciences, jointly with the National Academy of Education, has established, in the

Division of Behavioral Sciences of the National Research Council, the Committee on Basic Research in Education in order to support the conduct of research of a fundamental character in education. The program is designed to stimulate work on problems relevant to virtually all aspects of education. Individual projects approved under the Committee's sponsorship are funded by the Bureau of Research, USOE.

Under its charge, the committee has interpreted its stimulative activities broadly. Thus, they are in the process of encouraging molecular biologists to explore the physiological processes of encoding memory as well as to investigate, for example, the social and economic sources of consumer demand for higher education. In the Committee's own words, "Many systems enter into education, ranging from the biology system that conditions and constrains learning to the social system that conditions and constrains the organization of schools. Basic research leading to a better understanding of the nature and functioning of any of these systems falls within the scope of the new program."[7]

Summary

The foregoing illustrates the tremendous range and diversity of responsibility in the United States for sponsoring educational research and development. At the head of the pack, as it were, are to be found the Federal agencies who provide the great bulk of the resources now available for supporting such programs. The United States Office of Education is chief among these, but extremely important roles are also played by the educational research activities of the National Science Foundation and the Office of Economic Opportunity. Important support, but not of the same mission-oriented sort as the three previously mentioned agencies, also comes from the National Institute of Mental Health and the National Institute of Child Health and Human Development. A variety of other agencies also contribute resources of some significance.

To a lesser degree, private foundations, private industry, and State governments sponsor educational R&D. Professional associations and other arrangements (COBRE, for example) also perform significant functions in this regard.

The manner in which the responsibilities of sponsorship are carried out is as varied within each class of sponsor as it is across classes of sponsors. Thus, among Federal agencies, NSF's Course Content Improvement Program differs from NIMH's de facto support of work which is of considerable interest to educators and educational researchers but primarily as a by-product of serving quite another mission. The difference between the Kettering Foundation's support of educational R&D and support by the other two foundations described (Ford and Carnegie) is also readily apparent.

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[7] "A New Program of Basic Research in Education," Committee on Basic Research in Education, July, 1968, p. 2.

Such diversity is at the same time enriching and problematical. It provides a variety of options from which the interested practitioner can choose, but it also tends to complicate attempts to acquire focus on any overall strategy for educational improvement through research and development.

Chapter V

THE ORGANIZATION OF EDUCATIONAL RESEARCH IN THE UNITED STATES: PERFORMERS

The number and variety of sponsors of educational research and development in the United States is matched by an even richer array of performers and instrumentalities for carrying out research, development, demonstration, dissemination, and research related manpower development activities for education.

Some of the instrumentalities for conducting research and development activities in education have long existed. But others are brand-new creations directed explicitly to the performance of one or another function in educational research. Some carry out educational research as their only or primary function; others are involved only peripherally or as part of a broad range of other activities in which they are engaged.

Colleges and Universities

The bulk of the work in educational research and development is performed by persons affiliated with colleges and universities. Procedures for gaining support of such activities follow familiar patterns. Individual faculty members, singly or together, prepare proposals for work they would like to perform. At some institutions, proposals require formal approval by faculty or administrative committees before being transmitted to the appropriate granting agency or foundation.

Increasingly, colleges and universities are establishing new administrative positions for the coordination of research activities or are designating a faculty member to perform that role. Such individuals are focal points for information about research programs or opportunities and frequently play an important role in critiquing and shaping proposals before they are submitted to prospective granting agencies.

College and university faculty members are constrained in their pursuit of research funds only by the policies of their respective institutions. As far as most granting agencies are concerned, departmental location is no barrier for educational research and development awards. Virtually all social and behavioral science departments or schools are eligible and indeed have received grant awards in the various institution.

A large portion of research awards, however, continues to go to researchers affiliated with departments or schools of education. In 1963, approximately a quarter of professional schools and large departments of education had research committees or councils and a third had coordinators for faculty research. A survey conducted two years later of deans and research coordinators revealed that nearly half of the professional schools of education had research units of one kind or another.[1]

Research coordinators carry out four types of tasks: administrative responsibilities, intellectual leadership, communication, and stimulation of research. Their most common role is assisting faculty members in writing proposals and encouraging them to undertake research. This role is closely followed in importance by such activities as facilitating communications among researchers and communicating the needs of the research program to the administration. The intellectual leadership of the research coordinators is very largely confined to the phase of getting research under way.[2]

Research committees or councils fall into two major types or some form of combination of the two. The first type is a policy council which advises the administration on needed policies related to research. The second type is a facilitating committee which advises faculty members who are preparing research proposals and performs other promotional roles.

Sieber and Lazarsfeld's studies indicate that the two types of committees are fairly distinct. Policy committees tend to be advisory in nature. They sometimes decide policy on faculty research proposals submitted for local support, and they may serve as a communication link on research matters between the dean's office and faculty members. The facilitating committees, on the other hand, tend to play a major role in fostering and aiding faculty research. They may encourage research efforts through symposia and other similar types of programs. As committees advising the faculty members who are preparing research proposals, they function in a manner similar to seminars reviewing doctoral dissertations.

Research organizations associated with schools of education include (a) highly autonomous enterprises with sizable staffs and large budgets devoted almost entirely to empirical research; (b) a variety of smaller operations concerned with developmental and service activities or with facilitating the small-scale research of independent faculty members and (c) arrangements which are almost indistinguishable from the teaching departments which comprise them. Some of the units are (1) training facilities with project money, (2) informal teams of faculty members who share some facilities and resources, (3) offices for inhouse research on the operations of the institution, (4) laboratory schools which make serious efforts to evaluate new educational practices, (5) centers which reach into several departments of the schools and university for personnel and resources, and (6) bureaus which are equally concerned with both the provision of services to local schools and research.

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[1] Sam Sieber and Paul Lazarsfeld, The Organization of Educational Research in the United States, ERIC Document ED 010 276, 1966, p. 33.

[2] Ibid., pp. 34-36.

Sieber and Lazarsfeld's study involved 64, or some 90 percent, of the educational research units organized within or affiliated with professional schools or departments of education training individuals at a doctoral level. Although Sieber and Lazarsfeld concluded that only a minority of researchers in schools of education are associated with such research units, they still are a significant feature of educational research as it is organized in the United States. (A survey of authors of empirical research articles published in scholarly journals in 1964 revealed that only 21 percent of the authors who were primarily affiliated with graduate schools of education did their research in association with the research unit.)[3]

Sieber and Lazarsfeld found that the research units could be classified in terms of four dimensions: (1) research orientation, (2) substantive focus, (3) departmental affiliation, and (4) facilitation of non-staff researchers in the teaching departments. Almost two-thirds of the research units are mainly devoted to research rather than to field services, but only about half of those are highly research-oriented. Almost two-thirds of the research units carry out research on a variety of topics instead of specializing in one area. Most of the units are non-affiliated with a particular department in the school of education and about the same number of units facilitate the research of non-staff faculty members.

Sieber and Lazarsfeld's examination of differences in research units and the correlation of those differences with the age of the research units suggests that newer research units tend to be more research oriented, more often affiliated with the department, and more often facilitative. The proportion of Federal money in the budget of the research units, however, is highly related to research orientation, and therefore it is reasonable to conclude that the trend toward heavier involvement in research probably results in the main from increased Federal support in the past decade.[4]

Regional Educational Laboratories

After colleges and universities, the second largest group of performers are in the regional educational laboratories. The genesis of this group of new institutions in American educational research and development is to be found in the deliberations of the Task Force on Education, appointed by President Lyndon Johnson, which worked during the fall of 1964. It was chaired by John Gardner, the former head of the Carnegie Corporation, later Secretary of Health, Education, and Welfare, and now head of the Urban Coalition.

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[3] *Ibid.*, p. D-7.

[4] *Ibid.*, pp. 104-115.

With a mandate from President Johnson to study American education and to make proposals about legislation and financial support for education, the Task Force included among its recommendations the need for and the desirability of creating a group of essentially new institutions. They were to carry out educational development and a variety of other tasks relating to the diffusion of research-based innovation throughout the Nation's educational system.

The Education Task Force's recommendations were translated into legislative proposals in the form of amendments to the existing Cooperative Research (P.L. 83-531) authorization. Presented to the Congress as Title IV of the proposed Elementary and Secondary Education Act of 1965, the legislation was signed into law on April 11, 1965. Guidelines for the National Program of Educational Laboratories were issued by the Office of Education in August, 1965, and prospectuses for the establishment of the first round of institutions were received by the Office of Education by October 15, 1965. At the beginning of February, 1966, the first 11 contracts were negotiated. (One additional organization already existed in the form of a research and development center.) Three months later an additional seven contracts were negotiated. By September, 1966, 20 regional educational laboratories were all under developmental or operating contracts.

The mission of the program of regional educational laboratories is to speed the intelligent application and widespread utilization of the results of educational research and development. The over-all objective of the program is to create and demonstrate a rich array of tested alternatives to existing educational practice, leaving choice regarding adoption or adaptation of these alternatives in the hands of State and local educational agencies.

The development of the network of regional educational laboratories was guided by the understanding that no single existing institution was strategically located or empowered to relate effectively all segments of the educational community whose involvement was necessary to produce quality educational change through educational development throughout the highly decentralized U.S. school system. The judgment was made that a new institution was required to stimulate a powerful educational partnership of individuals and agencies with a wide variety of jurisdictional responsibilities to tie research and development more closely to the improvement of instructional practice.

The educational laboratories are structured to bring together on governing boards individuals from State departments of education, public and private schools, colleges and universities, schools and departments of education, and industrial and cultural organizations. These people would know existing educational problems and needs, would be competent in directing the design and development of programs geared to attack those problems through development and diffusion activities, and would have the experience and authority to operate in the jurisdictions affected by such programs.

The laboratories are independent, non-profit corporations with their own governing boards and management. Responsibility for decisions regarding program objectives, personnel, allocation of resources, and program operation resides in the governing boards of the laboratories. Each laboratory has identified strategic program areas relating to problems of national significance. Each has established its own form of government. There were initially twenty laboratories receiving support from the Office of Education.[5] The history of U.S.O.E. Bureau of Research support for the 20 laboratories is shown in Table 1. The name and area of primary emphasis of each laboratory is presented in the paragraphs which follow.

The Appalachia Educational Laboratory (AEL) is concentrating on the special educational problems caused by the geography and isolation of the Appalachian region. A model for cooperative use of material and human resources is being developed. Initial cooperative projects have included the use of telelectures and television in three pilot areas: (1) special curriculum adaptations (2) early childhood education at home (via television as there are no public kindergartens in the region), and (3) a program in language arts and reading especially appropriate to the problems of Appalachian children.

The Center for Urban Education (CUE) is primarily concerned with the improvement of educational practice in metropolitan areas. Four staff committees direct the work of the Center: Curriculum, Community Relations, Mass Media, and Educational Personnel. The Curriculum Committee is testing a number of strategies which will insure literacy in the early grades, including multiculturally based programs which will take into account the acquired vocabulary of urban children. The Community Relations Committee is assisting the implementation of integration programs in urban communities, and the Educational Personnel Committee is seeking ways to improve the morale and effectiveness of new elementary teachers in urban ghetto schools. The Mass Media Committee is assessing the effect of mass media on the development of school-age children. The CUE staff has published a number of monographs and puts out a bimonthly periodical, The Urban Review.

The Central Atlantic Regional Educational Laboratory (CAREL) is developing an integrated arts curriculum for young children, ages 3 to 9. Artists, dancers, actors, musicians and writers are directly involved in creating open-ended and evocative curriculum guides for classroom teachers. Laboratory staff are pilot testing materials in classroom settings and conducting training workshops for elementary teachers.

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[5] Owing to budgetary limitations, after August 1969 five of the twenty will not continue to receive support under the Federal appropriation for the laboratory program. These laboratories are the Central Atlantic Regional Educational Laboratory (CAREL), Cooperative Educational Research Laboratory (CERLI), Michigan-Ohio Regional Educational Laboratory (MOREL), Rocky Mountain Educational Laboratory (RMEL), and South Central Region Educational Laboratory (SCREL).

Table 1

Bureau of Research Support for
Regional Educational Laboratories

	1966 *	1967	1968	1969
APPALACHIA EDUCATIONAL LABORATORY	319,880	1,200,000	993,795	895,478
CENTER FOR URBAN EDUCATION	918,900	2,539,000	2,675,000	2,633,794
CENTRAL ATLANTIC REGIONAL EDUCATIONAL LABORATORY		570,257	780,000	390,000
CENTRAL MIDWESTERN REGIONAL EDUCATIONAL LABORATORY	695,082	805,640	1,350,000	1,700,000
COOPERATIVE EDUCATIONAL RESEARCH LABORATORY, INC.	188,580	410,000	600,000	270,000
EASTERN REGIONAL INSTITUTE FOR EDUCATION	199,613	633,715	943,385	998,700
EDUCATION DEVELOPMENT CENTER, INC.	168,270	267,000	1,041,162	959,655
FAR WEST LABORATORY FOR EDUCATIONAL RESEARCH AND DEVELOPMENT	375,000	730,249	1,250,000	1,685,170
MICHIGAN-OHIO REGIONAL EDUCATIONAL LABORATORY	184,240,	299,600	800,000	384,500
MID-CONTINENT REGIONAL EDUCATIONAL LABORATORY	600,000	900,000	730,000	937,713
NORTHWEST REGIONAL EDUCATIONAL LABORATORY	420,810	1,333,000	1,543,500	1,690,000
REGIONAL EDUCATIONAL LABORATORY FOR THE CAROLINAS AND VIRGINIA	190,209	349,472	693,744	820,000
RESEARCH FOR BETTER SCHOOLS, INC.	406,447	1,603,377	2,089,240	2,700,000
ROCKY MOUNTAIN EDUCATIONAL LABORATORY	285,700	646,156	514,039	346,000
SOUTH CENTRAL REGION EDUCATIONAL LABORATORY	180,705	451,000	8,700,000	320,000
SOUTHEASTERN EDUCATIONAL LABORATORY	362,100	739,000	670,000	670,000
SOUTHWEST EDUCATIONAL DEVELOPMENT LABORATORY	216,349	1,399,939	1,400,000	1,700,000
SOUTHWESTERN COOPERATIVE EDUCATIONAL LABORATORY	294,200	696,900	751,867	862,244
SOUTHWEST REGIONAL LABORATORY FOR EDUCATIONAL RESEARCH AND DEVELOPMENT	830,225	1,570,000	2,235,000	2,486,726
UPPER MIDWEST REGIONAL EDUCATIONAL LABORATORY	530,000	525,000	678,000	800,000
	7,366,310	17,669,305	22,438,732	23,250,047

*Fiscal Years, ending June 30.

The Central Midwestern Regional Educational Laboratory (CEMREL) has five major program interests: (1) development of a comprehensive mathematics curriculum for the general student population in grades K-12; (2) development of a curriculum in aesthetics education for the general student population in grades K-12; (3) development, application, and evaluation of the results of an implementation model for exemplary social studies curricula; (4) design of teaching strategies, with related materials, particularly appropriate to special student populations; and (5) demonstration of a program of computer-assisted instruction in arithmetic in a rural area and evaluation of its impact on student achievement and social interaction.

The Cooperative Educational Research Laboratory, Inc. (CERLI) is attempting to develop two new specialized personnel roles, Specialist in Continuing Education and Evaluator. The specialist in continuing education works with school personnel in a peer relationship to stimulate a process of continuing professional development. The evaluator will be trained to solve practical evaluation problems and to handle the role conflicts and other difficulties that hinder school evaluation efforts.

The Eastern Regional Institute for Education's (ERIE) major focus is on the collection, analysis and installation of curricular materials that emphasize the acquisition of process skills (learning how to learn). Specific emphasis is being given to the installation of a science curriculum which utilizes the process approach in 21 pilot schools in New York and Pennsylvania. These materials will be accompanied by an operational manual for use by school officials in disseminating, installing and maintaining this program.

The Educational Development Center (EDC) was created from a merger in January 1967 of Educational Services, Inc., a curriculum development corporation, and the Institute for Educational Innovation which had been established as the New England regional educational laboratory. The laboratory staff is working with schools in four communities - the Cardozo district of Washington, D.C.; Bridgeport, Connecticut; Boston, Massachusetts; and Brunswick-Rockland, Maine - to improve the quality of their educational programs. Initially the laboratory is creating a resource team and resource center in each of the four communities. The centers will be places for teachers, administrators, parents, and community leaders to learn about new curriculum materials and the ways in which they might be used in educational programs in their communities.

The Far West Laboratory for Educational Research and Development (FWLERD) is engaged in three major product development efforts. In one, an individualized system of teacher education is being developed for training teachers in the critical teaching skills and behavior patterns. The laboratory is designing training models which require a minimum of special personnel and facilities, provide for skill practice, and are usable for teaching a variety of skills; using these models, a large number of training units are being produced. In a second effort, strategies are being developed to increase the ability of local school personnel to make rational decisions in planning for the adoption of educational developments. Through support from a variety of government and private sources, an articulated instructional program for children ages three through nine is also being developed on the basis of the experimental program of the New Nursery School in Greeley, Colorado. Elements now underway include a toy library for use at home by parents of very young children, and Head Start and Follow-Through programs.

The Michigan-Ohio Regional Educational Laboratory (MOREL) has developed an inservice program to increase the extent to which teachers regularly examine and redirect their own teaching behavior to effect desired student outcomes. A leader works in the practical setting of the school with small groups of teachers called field action units. A second effort is the design and installation of a model regional transfer facility which links personnel, institutions, and published resources with educators.

The Mid-Continent Regional Educational Laboratory (MCREL) program has two major thrusts: self-directed learning and preparing teachers for inner-city schools. Studies are underway to identify the student behavior which will elicit self-directed learning (SDL) in students. One hundred fifty science lesson guides designed to promote SDL have been developed for tryout in selected secondary schools. The inner-city teacher education program is testing past performance in obtaining and retraining teachers for inner-city schools. Selected public school systems and institutions of higher education from Kansas, Nebraska and Missouri are cooperating with MCREL in these two programs.

Although the Northwest Regional Educational Laboratory (NWREL) program concentrates on the special educational needs of a large region characterized by rural isolation and growing inner city problems, its programs have national implications. Instructional sequences are being developed for training teachers in the basic repertoire of skills needed for assuming the role of instructional managers of individualized programs. In an attempt to improve the quality and relevance of educational experiences for inner-city populations and Indian communities, training programs are being developed to prepare members of these communities and of education related agencies in the skills necessary for joint planning and action. In addition, the laboratory is expanding the learning opportunities of rural youth by developing programs that employ a variety of media for individual and small group instruction and counseling.

The Regional Educational Laboratory for the Carolinas and Virginia (RELCV) is the only regional laboratory which has a focus on higher education as well as projects at the elementary and secondary level. Initially the laboratory is working with twenty four-year colleges and universities and nine two-year colleges to upgrade their educational practices. Each of the institutions' presidents has assigned a personal assistant to work with the laboratory and within the institution to identify and plan for needed changes. Among long-range goals are the development and dissemination of model computerized systems for institutional research, decision making, and long range planning; faculty development; and a two-year college comprehensive instructional improvement system. At the elementary and secondary level the laboratory is introducing the Individually Prescribed Instruction program (developed by the University of Pittsburgh Learning Research and Development Center) in selected schools within the region.

Research for Better Schools' (RBS) major program is the field testing, monitoring, and further development of the Individually Prescribed Instruction (IPI) system developed by the Pittsburgh Learning Research and Development Center. Teacher training programs in the use of the IPI system are being carried out. Programs to humanize learning and improve school administration are being planned.

Diagnosis and prescription for individual learning disabilities in elementary school children is the primary interest of Rocky Mountain Educational Laboratory's (RMEL) program. Diagnostic instruments are being developed, and teachers in the region are becoming familiar with relevant research, teaching strategies and materials available for remediation. A program in occupational education is in the planning stages.

At South Central Region Educational Laboratory (SCREL), the major program concentration is on early childhood compensatory education for three populations: the non-reservation Indian, Delta Negro, and white Ozarkian. Initial emphasis is on improvement of basic skills and self-concept. To compensate for the absence of kindergartens throughout the region, the laboratory is field testing models for educational day care and Saturday school programs.

The Southeastern Educational Laboratory (SEL) is developing two programs to improve the education offered disadvantaged children of its three-state region. The first seeks to overcome educational problems arising from students' non-standard speech patterns by developing a language enrichment program. The second aims to improve human relations and attitudes in schools of the region by developing an interpersonal relations curriculum. Supplementary projects include a preschool readiness program for rural isolated children.

The Southwest Educational Development Laboratory's (SWEDL) region has three predominant minority groups with special educational needs: The Negro-American, the Mexican-American, and the French-Acadian. The laboratory is attempting to meet these needs by developing new instructional programs at the preschool level and by designing new curriculum materials and teaching strategies in bilingual, mathematics, and multicultural social education at the primary level.

The initial Southwest Regional Laboratory for Educational Research and Development (SWRL) program has four primary areas: communication skills for grades K-4; generalized problem-solving skills for grades K-4; computer-managed instruction in reading, reading readiness, and mathematics at the first-grade level; and a computer-managed administrative planning system to assist in administrative decision-making. Both computer programs are conducted in cooperation with the System Development Corporation in Santa Monica, California.

The Southwestern Cooperative Educational Laboratory (SWCEL) is committed to improving the language arts skills of Mexican-American, Indian, and Negro children. Programs are being developed to improve the preschool acquisition of oral language; to continue oral language instruction in the primary grades; and to ease the transition from oral language to reading.

The Upper Midwest Regional Educational Laboratory's (UMREL) staff is seeking to improve the learning of children through the application of reinforcement theory to the classroom. Focusing on the teacher as behavioral engineer, the laboratory will develop programs to train teachers to restructure their classroom management, individualize the curriculum and redesign the learning situation to reinforce desired pupil learning. Initial settings for experimentation are in inner-city and Indian schools.

Research and Development Centers

A number of arrangements for the support of programmatic research and development activities fit generically under the heading of research and development centers. These include the Research and Development Centers Program administered by the Bureau of Research under the authority of the Cooperative Research Act, the Educational Policy Research Centers, The National Laboratory for Early Childhood Education, the Vocational Research Centers, and the research and development centers administered under the research authorization for handicapped children and youth.

Research and Development Centers (Cooperative Research)

The Research and Development Centers Program was established in 1963 under the then-existing provisions of the Cooperative Research Act. The program was a response to at least three major concerns relating to prior project research and development efforts.

The first was that previous efforts tended to be small and fragmentary and the results neither conclusive nor cumulative in character. Second, project efforts were not closing the gap between research and practice. Research results were not being used as a basis for developing new educational materials or practices; few schools had adopted the research products that had been developed; communication between universities and teacher-training institutions, State departments of education, and local school systems was poor.

Third, the field of education had not attracted the research personnel from the behavioral and social sciences even though their active involvement with educational problems was both necessary and desirable. The Research and Development Centers Program was an attempt to supplement the small-scale efforts with broader programs of interrelated activities to overcome these problems.

A center is conceived as a place where a critical mass of interdisciplinary talent and other resources can be focused on a significant educational problem. The center designs and conducts a coordinated and interrelated program of basic and applied research and exploratory development that seeks to identify solutions to the problem. The center generally carries this R&D process through a pilot tryout of a solution in a field setting, and they are responsible for disseminating the results of their work to specialized audiences. All of the centers under this program are located on the campuses of major universities. The funding history of the centers is given in Table 2. The name, location, and problem focus of each center is developed in the following paragraphs.

The Research and Development Center in Teacher Education (University of Texas) is determining by empirically tested experiments which processes in teacher education will produce teachers who are maximally effective in inducing learning in all types of children. Projects include design studies to measure pupil gain, self-contained classroom studies, and studies of individualized instruction through team teaching.

The Stanford University Center for Research and Development in Teaching is concerned with the theory and practice of teaching. Under investigation are the effects of the teacher's acts on the pupil, modifications in teacher training, and the effects of administrative practices on the teacher. There are three major programs: The program in the Behavioral Domain is a study of the effect of teacher behavior on pupils; the program in the Personological Domain is a study of the determiners and consequences of teacher traits and characteristics; and the program in the Institutional Domain is a study of the conditions which surround teachers. Several teacher training films have been produced on such topics as "Micro-Teaching," "Technical Skills in Teaching," and "Role Playing."

The Research and Development Center for Cognitive Learning's (University of Wisconsin) major interest is to secure efficient learning of children and youth in the cognitive domain through refinement of learning theory, improvement of educational technology, development of exemplary instructional programs, and the invention and refinement of models for conducting research in school settings. Instructional programs in development include a television course, "Patterns in Arithmetic," an English language and composition course; a program in elementary science; and an individualized reading program.

The Research and Development Center in Educational Stimulation (University of Georgia) seeks greater achievement for children from ages 3-12 through early and continuous intellectual stimulation. Research, development and evaluation of instructional systems is being carried out at the pre-primary, primary, and intermediate levels for a cross-section of children and for disadvantaged children. The center is studying the influence of cultural, social, emotional, and organizational variables which affect educational stimulation.

The Center for the Study of the Evaluation of Instructional Programs (University of California, Los Angeles) aims to improve the theory and practice of evaluation of instructional programs in school settings. Studies will include evaluation of classroom instruction, the study of contextual variables (relationships between student characteristics and instructional procedures), study of criterion variables (development of measures of individual student's achievement and organizational criteria), and the evaluation of elementary school and higher education programs.

The Center for the Study of Social Organization of Schools and the Learning Process's (Johns Hopkins University) major program interests focus on the social and administrative organization of the school and community as related to the learning process of diverse groups of students. Research and development efforts include the development of simulation games and studies of the influence of games on student learning, study of education and social change for Negro Americans (including a further analysis of the data in the national study of "Equality of Educational Opportunity," or the Coleman Report), studies of modification in the social organization of schools and classrooms which will enhance the acquisition of cognitive skills in socially disadvantaged children. A film, "Introduction and Orientation to Academic Games," is in production.

The Learning Research and Development Center's (University of Pittsburgh) major program interest is the interaction between learning research in the behavioral sciences and instructional practices in the schools. The Center is carrying out basic learning studies, conducting experimental development of computer-assisted instruction, doing field research in community schools, and conducting experimental school development in three areas: Individually Prescribed Instruction (IPI), responsive environmental projects, and a Primary Education Project (PEP). Two dissemination films have been developed on IPI: "The Oakleaf Project" and "R_X for Learning: IPI."

Through increased understanding of the social context in which educational institutions operate, the Center for the Advanced Study of Educational Administration (University of Oregon) hopes to bring about improved practices in educational administration and organization. Four major program areas have developed: innovation and organizational structure, educational administration and the normative and value structures of American society, career processes of educational personnel, and the allocation of resources in higher education.

The Center for Research and Development in Higher Education (University of California, Berkeley) has designed research and development activities to assist individuals and institutions responsible for higher education "to improve the quality, efficiency, and availability of education beyond the high school." A dissemination journal, The Research Reporter is published quarterly.

Vocational Research Centers

Two research and development centers have been supported under the authorizations for vocational research contained in the Vocational Education Act of 1963, Section 4c. The funding history of these centers is shown in Table 3.

The Center for Research and Leadership Development in Vocational and Technical Education (Ohio State University) was set up to stimulate and encourage research nationally in vocational and technical education. Procedures encompass basic and applied research, field testing, dissemination and demonstration activities, and leadership development of state personnel. The ERIC Clearinghouse on Vocational and Technical Education is also a part of this Center.

The Center for Research, Development and Training in Occupational Education (North Carolina State University) is inter- and multidisciplinary in scope and organization. Nine departments of the University are contributing their resources and research potential to the Center. The total program is divided into five areas, the research program, the evaluation program, the research development program, the research training program, and the services and conferences program.

Educational Policy Research Centers

The need for research activities oriented to the study of long-range futures for education and society arose within the Bureau of Research, USOE, at the time that serious efforts were launched to engage in research and development planning. When confronted with the long lead-times associated with R&D planning, program managers in the Bureau of Research became convinced of the importance of studying policy issues in education at a much longer range than had hitherto been attempted. After a considerable planning period two operational educational policy research centers were established by USOE in March, 1968. The funding history of these centers is shown in Table 2. The programs of each of the centers is presented below.

The Educational Policy Research Center at Stanford Research Institute is concerned with the problem of how education can participate in and facilitate what has been called the "necessary transition":

From	To
Violence and deterrence	Rational adjudication and moral force
Coercive power	Shared power
Environmental deterioration	Man-Nature synergism
Dehumanizing technology	Human-centered technology
Depersonalizing bureaucracy	Meaningful participation
Anomie, alienation	Responsibility
The affluent society	A humane society

Table 2

Cooperative Research Support for Research and Development Centers, Policy Centers, and the National Laboratory on Early Childhood Education

	1964*/	1965	1966	1967	1968	1969
Center for Research & Development for Cognitive Learning - Wisconsin	-	499,600	808,081	1,034,000	1,687,849	1,200,000
Center for the Advanced Study of Educational Administration - Oregon	508,769	533,586	663,186	675,558	590,000	493,812
Center for Research & Development in Higher Education - Berkeley	-	-	315,657	849,307	1,459,000	938,128
Research & Development Center in Teacher Education - Texas	-	-	459,175	762,730	1,190,419	820,000
Learning Research & Development Center - Pittsburgh	490,000	753,531	641,794	1,308,702	1,465,482	1,454,332
Research & Development Center in Education Stimulation - Georgia	-	-	401,118	731,552	1,237,326	758,000
Stanford Center for Research and Development in Teaching - Stanford	-	-	349,625	796,701	1,597,000	995,432
Center for the Study of the Evaluation of Instructional Program - UCLA	-	-	408,981	533,973	867,882	809,415
Center for the Study of the Social Organization of Schools and the Learning Process - Johns Hopkins	-	-	-	172,717	741,618	613,880
National Laboratory on Early Childhood Education	-	-	-	1,448,630	1,561,500	1,700,000
Educational Policy Research Center (SRI)	-	-	-	110,000	499,154	500,000
Educational Policy Research Center (SURC)	-	-	-	110,000	499,951	500,000

*/ Fiscal Years, ending June 30.

Table 3

USOE Support for Vocational Research Centers and State Research Coordinating Units

	1965 */	1966	1967	1968	1969
Ohio State Center	$ 968,160	-	$1,100,000	$1,500,000	$1,228,072
North Carolina State Center	356,355	-	865,000	725,000	520,000
Research Coordinating Units	2,177,270	1,690,297	1,871,370	1,057,231	2,386,600

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*/ Fiscal Years, ending June 30.

The center is exploring alternative futures and present options which arise from such a framework in terms of their relevance and importance to educational policy makers.

The Educational Policy Research Center at Syracuse University Research Corporation is currently developing a methodology for forecasting alternative futures which combines Delphi techniques with computer analytical capabilities. Through the development of "cross-impact matrices" and their computerization, the center will be able to construct "maps" of alternative futures, each of which would be based on differing mixes of options exercisable at this and future points in time. The center is also examining, in the context of their long-view responsibilities, the policy implications of individualizing instruction and alternative organizational patterns for education.

National Laboratory on Early Childhood Education

A somewhat different institutional model for carrying out educational research and development is provided by the National Laboratory on Early Childhood Education. Established under the amended provisions of the Cooperative Research Act, the laboratory is a distributed research and development center. The structure of the laboratory includes a National Coordination Center and an ERIC Clearinghouse (both located at the University of Illinois), and six research and development centers: at George Peabody College for Teachers, the University of Chicago, Syracuse University, the University of Arizona, Cornell University, and the University of Kansas.

The mission of the laboratory is to assume leadership in research and development for the improvement of education of young children, particularly those from birth through 8 years of age. The two principal thrusts of the National Laboratory program are the conduct of a coordinated research and development program of the highest quality and the continual analysis of the field to identify the problems most needing attention and point out the most promising educational ideas to those who can implement them. The funding history of this laboratory is shown in Table 2.

Handicapped Children Research and Demonstration Centers

The purpose of the Comprehensive Research and Demonstration Facility for the Handicapped, Teachers College, Columbia University is to construct a comprehensive research and demonstration facility to house a long-range programmatic research endeavor on five types of handicapped children (mentally retarded, emotionally disturbed, physically handicapped, visually impaired, and language and hearing impaired). The objectives of the center include: research into the educational problems of handicapped children; applications of research findings to program improvement;

demonstration of curricula, instructional systems, equipment, and materials; development of curriculum and materials centers; dissemination of findings; and training of research specialists.

The Center for Educational Research and Development in Mental Retardation, Indiana University, will stimulate, facilitate, carry out and coordinate a variety of research and development efforts to improve educational practice with the mentally retarded (IQ 40-85; age 3-21). The goals of such improvements are to enable more mildly retarded children to move successfully through school without being identified as retarded and to enable more children identified as mildly and moderately retarded during their school years to enter adult life as nonretarded, functional and acceptable members of society. To achieve these goals the R&D Center will carry out the following general types of activities: (1) research on the determinants and consequences of placement in regular and special classes; (2) development and testing of curriculum materials, teacher training techniques, and administrative arrangements to foster a retarded child's "passing" as normal in school; (3) research on teaching and learning processes related to the performance of identified retarded children; (4) development and testing of curriculum materials, teacher training techniques, and administrative arrangements to foster the adult success of children identified as mildly and moderately retarded in school; (5) training of new R&D personnel; (6) and periodic selective review of educational R&D in mental retardation.

The funding history of these two centers is given in Table 4. At least one new center is to be announced by June 30, 1969.

Instructional Materials Centers (IMC)

Under the research and development authorization for handicapped children and youth a network of fourteen Instructional Materials Centers (IMC) has been established. These centers are designed to provide special educators (those working with handicapped children) ready access to tested and validated instructional materials and other information regarding the education of handicapped children and youth. The centers carry out three functions.

A service function includes the acquisition of commercial and teacher prepared instructional materials; the description, classification, and organization of these materials; and the dissemination of materials and information to educators.

A research and development function of the centers includes the evaluation of instructional materials and the development and production of new materials on a pilot basis for experimental trial and demonstration.

A third function that the Instructional Materials Centers perform is the stimulation of production phases. IMC's contact organizations which have materials production capacity and encourage them to produce materials found

Table 4

USOE Support for Handicapped Research and Demonstration Centers and Instructional Materials Centers

	1966 **/	1967	1968	1969
Comprehensive Research and Demonstration Facility, Teachers College, Columbia	–	2,000,000*	469,540	765,860
Center for Educational Research and Development in Mental Retardation, Indiana Univ.	-	-	-	697,810 (est)
Instructional Materials Centers				
Michigan State University	178,495	18,751	260,000	250,596
University of Wisconsin	96,301	23,736	259,265	276,372
American Printing House for the Blind	110,494	9,789	83,386	105,564
Colorado State College	91,249	39,358	200,235	231,228
Boston University	-	221,208	113,412	254,868
George Washington University	-	187,865	128,605	259,416
University of Kansas	-	111,034	101,870	237,156
New York State Department of Education	-	165,000	114,496	279,504
Department of Special Education, Illinois	159,650	52,047	251,995	273,348
University of Texas	138,248	64,796	251,516	252,672
University of South Florida	160,512	61,004	194,452	245,448
University of Oregon	186,814	41,210	239,750	266,772
University of Kentucky	80,662	21,702	181,594	185,964
University of Southern California	-	190,763	209,853	252,204

*Construction award **/ Fiscal Years, ending June 30.

to be effective in the research phase.[6] Table 5 identifies the centers and the regions served by each. (Table 4 provides the funding history for each of the IMC's.)

Local Educational Agencies

Owing to the large number of school districts in the Nation, exact data pertaining to the involvement of local educational agencies as performers of educational research are not available. Studies have been conducted, however, which reach one or another dimension of the problem, and their results were used for the purpose of developing this report.

A recent study conducted by Edith K. Mosher under the sponsorship of the Far West Laboratory for Educational Research and Development reviewed a number of surveys on school research offices.[7] She based her conclusions on the findings which the scattered studies confirmed most strongly and consistently.

Dr. Mosher's study disclosed that districts probably do not recognize the need to establish a research office unless they enroll more than 12,000 students. Formally organized research programs are exceedingly rare in districts enrolling less than 10,000 students. Sixty-three percent of the country's 455 largest districts have research offices; such offices are notably more prevalent in districts enrolling more than 50,000 students. The districts with research offices account for only about 1.3 percent of the total number of local school districts in the United States. Research offices, therefore, are hardly typical of the American school district.

Information on the duties and responsibilities of school-based research offices or organizations suffers from the long-standing confusion as to what school-based research is or should be. In the reports Dr. Mosher reviewed, however, school-based research staff tended to report and categorize as research all their activities in conjunction with surveys and experimental studies, especially if some kind of project report was produced as an end product.

A study undertaken by the Research Division of the National Education Association indicated that 63 of 102 research offices surveyed devoted less than 40 percent of their time to surveys and experimental work. The remainder was taken up with testing programs, collection of information and data from other systems, preparation of department reports, and

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[6] Further information on the Instructional Materials Centers may be garnered from George Olshin, "Special Education Instructional Materials Centers Program," Exceptional Children, March, 1968, pp. 515-519.

[7] Edith K. Mosher, What About the School Research Office?, Berkeley, California: Far West Laboratory for Educational Research and Development, February, 1969.

Table 5
Fourteen Regional Instructional Materials Centers

Center	Region Served	Center	Region Served
Michigan State University	Michigan Indiana Ohio	N.Y. State Department of Education, Bureau of Physically Handicapped Children	New York State
University of Wisconsin	Wisconsin Minnesota	Dept. of Special Education Superintendent of Public Instruction	Illinois
American Printing House for the Blind	National	University of Texas	Texas Louisiana Arkansas Oklahoma
Colorado State College	Colorado Montana Wyoming New Mexico Utah	University of South Florida	Florida Alabama Georgia Mississippi S. Carolina Puerto Rico Virgin Islands
Boston University School of Education	Massachusetts Connecticut New Hampshire Maine Vermont Rhode Island	University of Oregon	Oregon Alaska Hawaii Idaho Washington Guam
George Washington Univ. Dept. of Special Education	D.C. Delaware Maryland New Jersey Pennsylvania Virginia	University of Kentucky	Kentucky Tennessee N. Carolina W. Virginia
University of Kansas School of Education	Kansas Iowa Missouri Nebraska North Dakota South Dakota	Univ. of Southern California School of Education	California Nevada Arizona

consultant services.[8]

About half of the school research offices have responsibility for test administration and analysis; about half are completely divorced from this responsibility. Nearly all school research offices monitor research conducted within their districts by outside personnel and act as information sources to external agencies seeking data on the programs and students of their district. Dr. Mosher reports that a recent meeting of research directors representing about 50 of the Nation's largest school districts revealed that district size and the employment of a full-time director are associated with increased involvement in administrative research and also that instructional research is receiving more attention than previously. The five distinct functions which these research organizations may have were identified as administrative support, planning, independent evaluation, instructional development, and data processing.[9]

The tremendous growth of Federal programs in support of education has created strong stimuli for the performance of evaluation activities by local school systems. Provisions in both Title I (funds for educationally deprived youngsters) and Title III (innovative and exemplary programs) of the Elementary and Secondary Education Act of 1965 have required the presentation of evaluative data. This has created strong impetus for the development of competencies and staff to perform this research-related activity.

Research Coordinating Units

The research coordinating units are instrumentalities created under the authorization of the Vocational Research Act of 1963 to stimulate, encourage, and coordinate research activities among State departments of education, universities, local school districts and others with an interest in vocational and technical education. Now operating in forty-six States and funded with monies made available through research appropriations for vocational research, these units undertake a variety of activities. They include:

1. Operations of research advisory committees
2. Inventories of research resources within the State
3. Review of State vocational programs to identify problems amenable to research
4. Formulation of research priorities, assignment of roles, and coordination efforts
5. Dissemination of research information
6. Review of research proposals and provision of technical consultant services

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[8] "Research Units in Local School Systems," Educational Research Service Circular (NEA), No. 5, 1965, p. 51.

[9] Mosher, op cit. pp. 37-38.

Annual support for each unit approximates $50,000. (The Federal funds directed to these units over the past four years are presented in Table 3. Future support will be from State allocations.)

Nonprofit Agencies as Performers

In addition to nonprofit agencies already indicated above (such as colleges and universities, educational laboratories, and the like) a number of agencies exist in the United States which are actively engaged in the performance of educational research and development. These include such organizations as the American Institutes for Research, Educational Testing Service, the Institute for Educational Development, and similar kinds of institutions. Several of these institutions are described below.

Educational Testing Service (ETS) is a nonprofit organization providing measurement and research services to education. ETS was founded in December 1947 by the American Council on Education, the Carnegie Foundation for the Advancement of Teaching, and the College Entrance Examination Board. Its charge was to unify and extend the testing activities of the three founding agencies and to provide leadership in the field of educational measurement.

ETS prepares aptitude and achievement tests taken by millions of students - for college admission, for scholarship selection, for use in guidance, placement and evaluation, and for professional selection and certification.

Research conducted by ETS in education and measurement currently includes more than 250 studies - on the culturally disadvantaged, early learning, careers and vocations.

ETS has a permanent staff of more than 1300 persons, including specialists in guidance, psychology, education, administration, statistics, pyschometrics, and all the major teaching fields. In addition, continuing advisory committees of leading educators, research psychologists, testing specialists, and other experts in various fields help ETS define its special role in the educational community.

ETS's most current annual report (1966-1967) discloses that in the year ending June 30, 1967, some $2,709,909 was expended for research, of which $1,570,970 was supplied by outside contractors and grantors.[10]

American Institutes for Research (AIR) is another large nonprofit scientific and educational institution engaged in research aimed at solving fundamental problems in learning and education. Staff psychologists, sociologists, statisticians, and educators work on a broad spectrum of research and development for governmental agencies, industrial organizations, and foundations. Much of the research is basic, but the orientation of AIR is toward the development of technologies and materials that can be applied to real-world problems. Evaluation of the applications comprises an important part of the general program.

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[10] Educational Testing Service Annual Report, 1966-1967, p. 67.

AIR currently operates out of three offices across the country employing over 325 full-time staff members. Their income in 1967, principally from project services, exceeded $5,000,000. Seventy percent of its funds came from various Federal agencies, 30 percent from private industry and foundations.[11]

Three different examples of non-profit performers of research are the Southern Regional Education Board (SREB), the Western Interstate Commission for Higher Education (WICHE), and the Education Commission of the States.

SREB was established in 1948 by interstate compact as a public agency of 15 member states cooperating to improve higher education. The Board works directly with State governments, academic institutions, and other agencies concerned with higher education to:

- Conduct research on the South's problems and needs in higher education
- Provide consultant services to States and institutions on problems related to higher education
- Find ways of solving these problems through programs of regional cooperation
- Disseminate information on higher education throughout the region

Basic support for SREB comes from annual appropriations by each participating state. Funds for special projects come from Federal agencies, private foundations, and other organizations.

SREB's research activities are designed to have a direct impact on higher education, either through faculty and administrative channels or through agencies responsible for the character and support of higher institutions. One of the main ways in which they try to accomplish this goal is through publication and wide distribution of studies. Another is through conferences and seminars. Significant findings and conclusions are considered by the Board, by advisory committees, and by legislators and the annual legislative Work Conference.

SREB has conducted research in such areas as administration and planning, faculty and students, financing, and programs and degrees. Special assessments have been completed on goals for higher education in the South, and higher education for Negroes.

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[11] AIR: 20th Year, Annual Report for American Institute for Research, 1967, p. 27.

SREB receives revenues of approximately $1.5 million annually, two-thirds of which is allocated to special project activities.[12]

WICHE is the counterpart of SREB for the Western states of the Nation. Its program activities are some five years younger. Its revenue sources are similar to SREB: they both operate at about the same level of support annually. Particular research and development activities in which WICHE has been involved include a contract with USOE to design, develop, and implement management information systems with a common set of uniform data elements; studies of mineral engineering and nursing education; and a regional program in mental retardation research.[13]

Finally, a third organization beginning to assume an increasing role in sponsoring/performing policy research activities for education is the Education Commission of the States, an organization of more than 40 states and territories devoted to furthering the working relationship among State governors, legislators, and educators for the improvement of education.

The Educational Resources Information Center (ERIC)

The Educational Resources Information Center is a national information system for acquiring, abstracting, indexing, storing, retrieving, and disseminating the most significant and timely educational research reports and program descriptions. ERIC collects, stores, and disseminates information on education. It furnishes copies of educational documents at nominal costs, prepares bibliographies and research reviews on critical topics in education, and coordinates the efforts of decentralized information centers throughout the country.

ERIC consists of four major interrelated components:

- Central ERIC. Headquarters staff in the Division of Information Technology and Dissemination, Bureau of Research, USOE, is responsible for developing, managing, and coordinating the system.
- The network of 19 clearinghouses. Each clearinghouse focuses on a specific topic or field.
- An ERIC Facility, currently operated under contract by North American Rockwell Company, to provide centralized document processing activities as well as computer, lexicographic and technical services. This contractor prepares

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[12] Southern Regional Education Board, 1948/1968 (Annual Report), p. 43.

[13] Western Interstate Commission for Higher Education, Annual Report-1968, passim.

the magnetic tape for the issues of *Research in Education* (RIE), the major abstracting and indexing publication of the Office of Education, as well as all other major output products which are computer generated using the ERIC files.

- The ERIC Document Reproduction Service (EDRS) operated under contract by the National Cash Register Company. EDRS sells the full text of documents cited in RIE, at nominal cost.

Figure 1 is a simplified flowchart of the ERIC document processing system. Central ERIC is responsible for collection of final reports from all projects supported by the Office of Education and other Federal agencies supporting research of interest to the educational community. Documents also are received regularly from the National Education Association, State Departments of Education, and many textbook publishers. Of major importance, however, are the documents acquired by the ERIC Clearinghouses. Each Clearinghouse is responsible for, and very actively pursues, the collecting of documents within its scope of interest from universities, professional organizations, individuals, or other sources productive of substantive documents pertinent to ERIC dissemination.

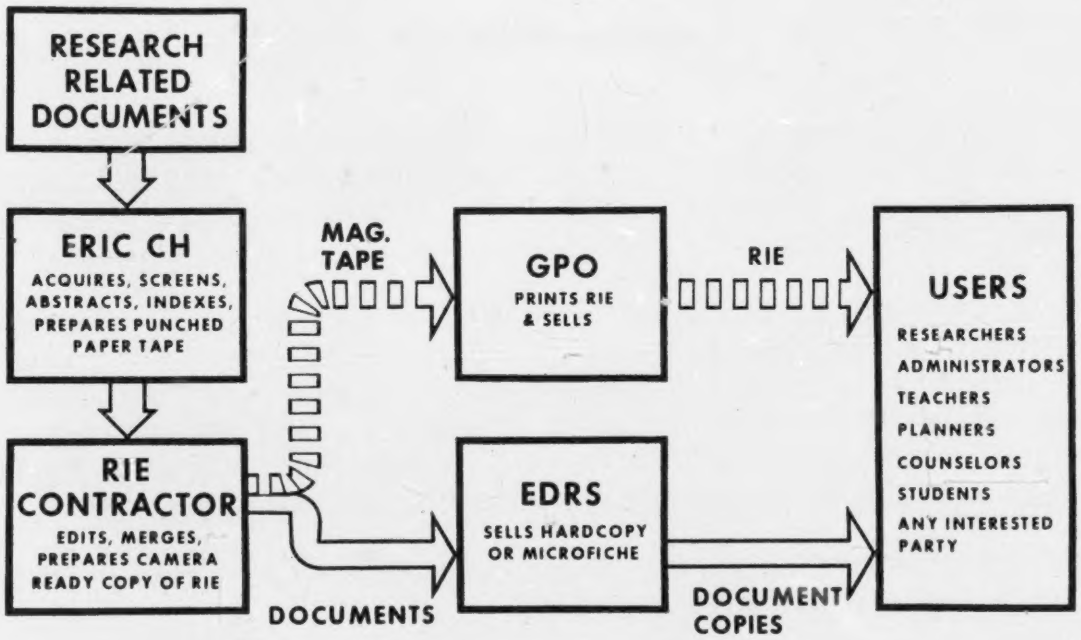
RESEARCH RELATED DOCUMENTS
ERIC CH
ACQUIRES, SCREENS, ABSTRACTS, INDEXES, PREPARES PUNCHED PAPER TAPE
RIE CONTRACTOR
EDITS, MERGES, PREPARES CAMERA READY COPY OF RIE
MAG. TAPE
GPO
PRINTS RIE & SELLS
RIE
EDRS
SELLS HARDCOPY OR MICROFICHE
DOCUMENTS
DOCUMENT COPIES
USERS
RESEARCHERS
ADMINISTRATORS
TEACHERS
PLANNERS
COUNSELORS
STUDENTS
ANY INTERESTED PARTY

Figure 1. ERIC Document Flowchart

Once received, documents are reviewed by the clearinghouse subject specialists for quality and significance to education. Those selected are abstracted and indexed by assignment of retrieval terms from the ERIC Thesaurus. Resumes of documents (that is, abstracts, retrieval terms and bibliographic information) from all ERIC clearinghouses are forwarded to North American Rockwell facility on a standard resume from where they are merged, stored on magnetic tape, and prepared for incorporation in RIE. The monthly issues of RIE are currently being sent to Government Printing Office (GPO) in the form of magnetic tape. GPO prepares the camera ready copy of RIE using the Linotron process of photocomposition and the issue is bulk printed and sold.

Copies of all reports cited in RIE (except for copyrighted items available only from the publishers) are forwarded to the ERIC Document Reproduction Service (EDRS) for microfilming and sale. Prices for documents are listed with each citation in RIE and they may be ordered from EDRS by their identifying ED (ERIC Document) numbers in either microfiche or hard copy form.

ERIC products currently can be grouped into three classes. The first, RIE, is the principal, continuing announcement bulletin for the report literature of education. All documents of significance added to the ERIC collection are announced through this publication. An abstract is provided for each document, along with the usual identifying information and author, institution and subject matter indexed. RIE also announces all new research project awards made by the USOE, and these are indexes in the same manner as reports.

Second, ERIC also arranges for the distribution of document collections of special significance. Generally, a catalog containing abstracts and/or indexes announces the documents whose full text is available from EDRS in either microfiche or hard copy form.

A third type of product, one which each ERIC clearinghouse is responsible for preparing, is a variety of documents which range from newsletters to exhaustive research reviews. A bibliography of ERIC Clearinghouses' information analysis products is under preparation and should be available soon. Over 300 bibliographies, critical reviews, and interpretive summaries have already been prepared and disseminated by the clearinghouses.

ERIC Clearinghouses are currently being supported in 19 areas. These are, together with their locations:

Adult Education
Syracuse University
Syracuse, New York

Counseling and Personnel Services
University of Michigan
Ann Arbor, Michigan

Disadvantaged
Columbia Univ.,Teachers College
New York, New York

Educational Administration
University of Oregon
Eugene, Oregon

Educational Media and
Technology
Stanford University
Stanford, California

Higher Education
George Washington University
Washington, D.C.

Junior Colleges
Univ. of California at
Los Angeles
Los Angeles, California

Linguistics
Center for Applied Linguistics
Washington, D.C.

Rural Education and Small
Schools
New Mexico State University
Las Cruces, New Mexico

Teacher Education
American Association of
Colleges for Teacher Education
Washington, D.C.

Teaching of Foreign Languages
Modern Language Association
of America
New York, New York

Early Childhood Education
University of Illinois
Urbana, Illinois

Educational Facilities
University of Wisconsin
Madison, Wisconsin

Exceptional Children
The Council for Exceptional
Children
Washington, D.C.

Library and Information Sciences
University of Minnesota
Minneapolis, Minnesota

Reading
Indiana University
Bloomington, Indiana

Science Education
Ohio State University
Columbus, Ohio

Teaching of English
National Council of Teachers
of English
Champaign, Illinois

Vocational and Technical
Education
Ohio State University
Columbus, Ohio

The rapid growth of ERIC as a central institution in the dissemination of educational research information is illustrated in the figures which follow.

Figure 2. Growth in Size of ERIC Document Collection

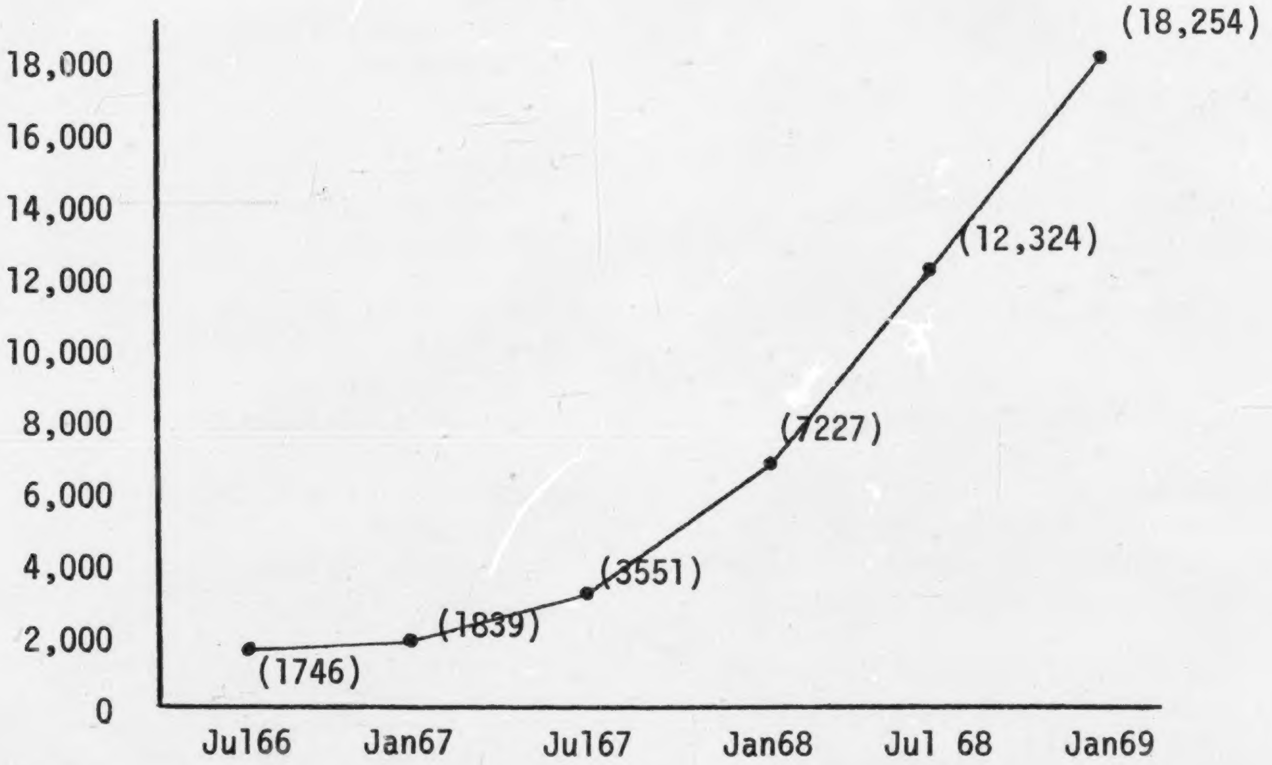

Figure 3. Growth in Number of Reports Cited in *Research in Education* (RIE)

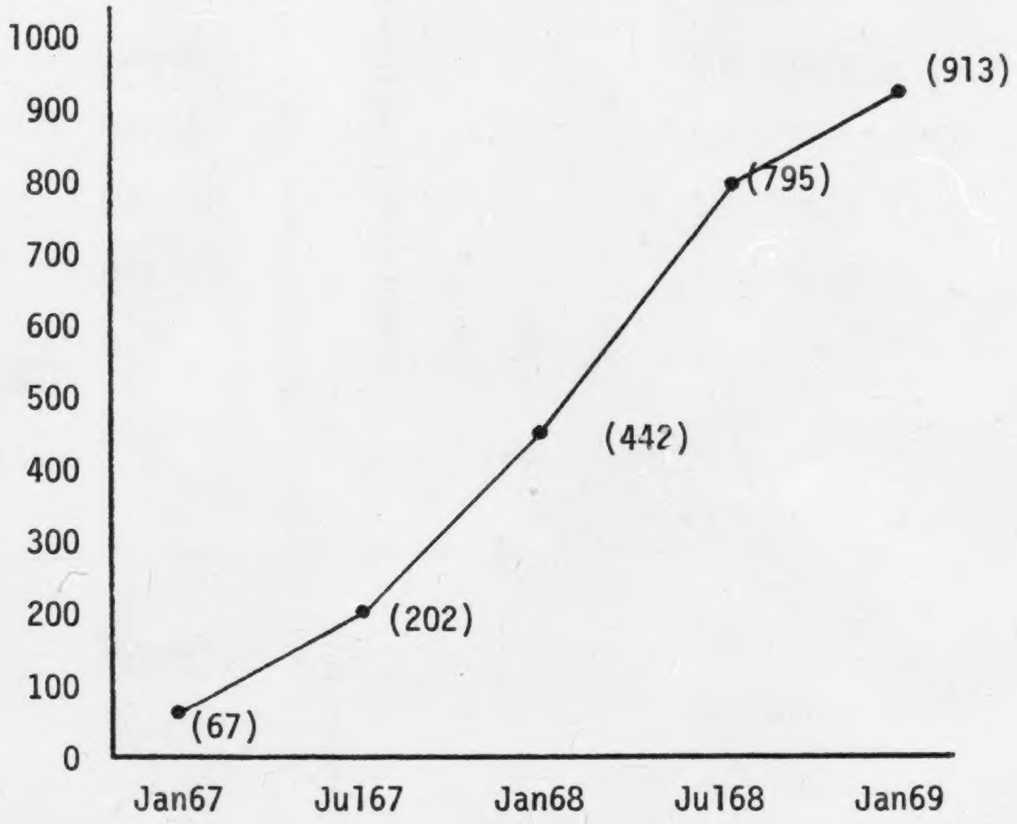

Figure 4. Sales from the ERIC Document Reproduction Service, 1965-1968

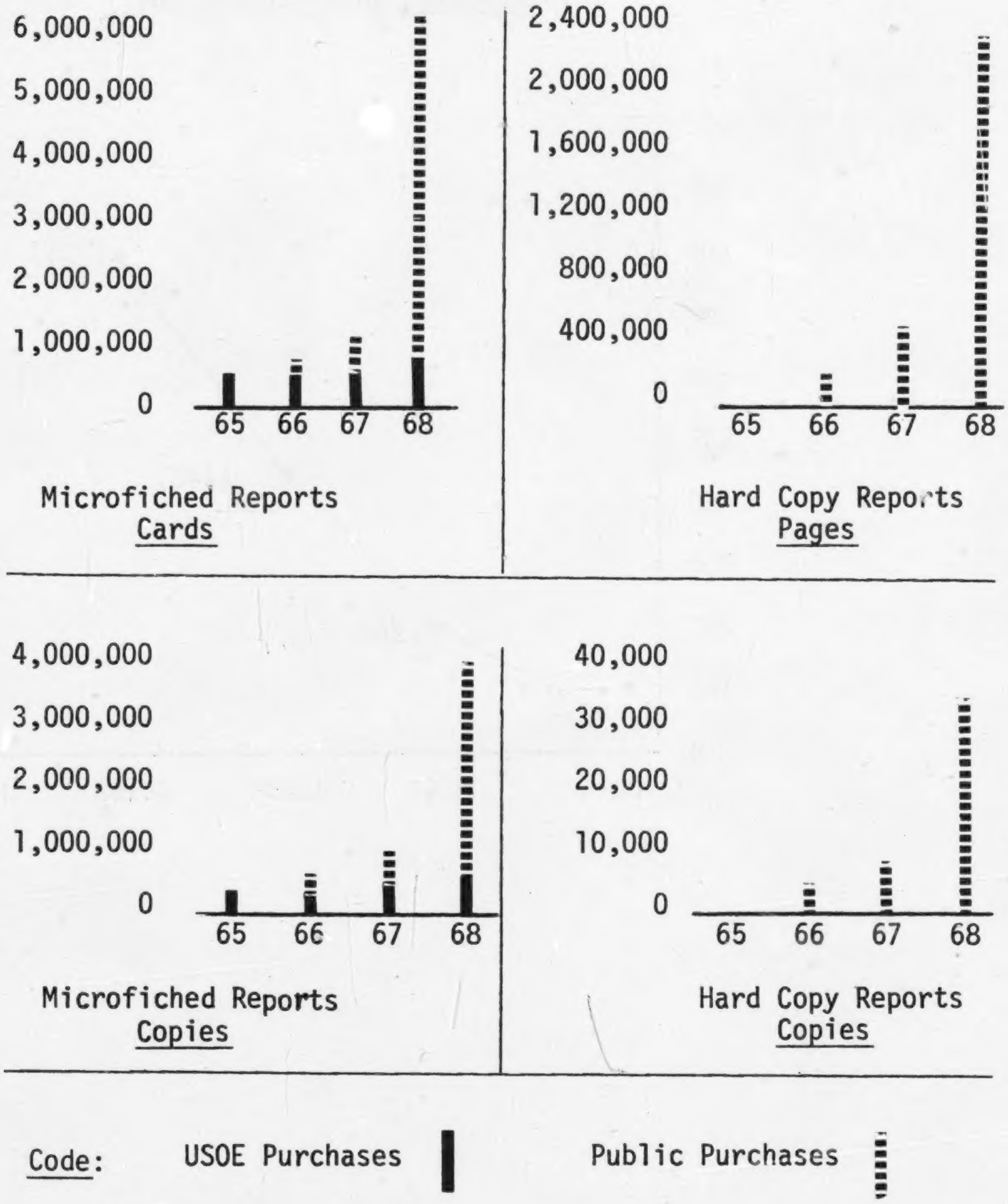

Table 6. RESEARCH AND TRAINING SUPPORT FOR DISSEMINATION

Funding for the ERIC System, FY 1966-69

Activity	1966 Obligation	1967 Obligation	1968 Obligation	1969 Obligation
Clearinghouses:				
1. Adult Education	$ ---	$148,934	$140,000	$181,300
2. Counseling & Guidance	90,903	123,791	124,500	191,300
3. Disadvantaged	230,106	189,000	74,992	201,300
4. Educational Administration	90,365	101,543	96,905	186,300
5. Educational Facilities	---	169,529	107,500	181,300
6. Educational Media & Technology	---	172,862 a/	112,591 a/	180,000 a/
7. English	---	110,000	127,000	176,300
8. Foreign Language	198,045 b/	---	136,872 b/	200,000 b/
9. Junior Colleges	108,731	136,635	115,054	191,300
10. Library and Information Sciences	---	184,878 i/	---	186,000 i/
11. Linguistics & the Uncommonly Taught Languages	164,140 c/	---	116,404 c/	135,000 c/
12. Reading	155,855	165,788	134,000	201,000
13. Science Education	122,031	134,056	71,000	191,300
14. Small Schools and Rural Education	130,337	127,380	114,496	181,300
15. Teacher Education	135,405	110,631 d/	95,766	171,300
16. Vocational and Technical Education	88,030	175,000 e/	195,000 e/	175,000 e/
17. Higher Education	---	---	---	125,000
18. Early Childhood Education	---	(248,630) f/	(260,000) f/	(310,000) f/
19. Exceptional Children	253,933	---	(242,000) g/	(165,000) g/
Subtotal - Clearinghouses	1,767,881	2,050,027	1,762,080	3,055,000

Table 6 - continued

Activity	1966 Obligation	1967 Obligation	1968 Obligation	1969 Obligation
Central Processing & Reproduction:				
Indexing, Searching and Retrieval System......................	177,570	807,167	899,793	953,000
Document Reproduction Service h/	24,750	49,500	140,488	150,000
Subtotal - Central Units	202,320	856,667	1,040,281	1,103,000
Requirements & Analytical Studies....................	---	143,788	43,200	68,000
Totals.................	1,970,201	3,050,482	2,845,561	4,226,000

Notes:

a/ Funded under "Defense Educational Activities - Educational Media Research" in 1967 and "Research and Training - Educational Media" in 1968 and 1969.

b/ Funded under "Defense Educational Activities - Foreign Language Research" in 1966, and "Research and Training - Foreign Language Research" in 1968 and 1969, except for $22,000 in 1968 and $35,000 in 1969.

c/ Funded under "Defense Educational Activities - Foreign Language Research" in 1966, and "Research and Training - Foreign Language Research" in 1968 and 1969, except for $21,955 in 1968 and $15,000 in 1969.

d/ Supported at City University of New York in 1966 and 1967 as "Clearinghouse for School Personnel."

e/ Funded under "Vocational Education and Research" in 1966 and 1967 and "Research and Training - Vocational R and D" in 1968 and 1969, except for $20,000 in 1968.

f/ Jointly supported by the Office of Education and Office of Economic Opportunity, as follows:
OE - "Research and Training - R&D Centers" - $85,000 (1968) and $150,000 (1969); and "Research and Training - General Education" - $98,630 (1967)
OEO- "Head Start" - $150,000 (1967), $175,000 (1968), and $160,000 (1969).

g/ Funded under "Education for the Handicapped - Research and Demonstrations."

h/ NCR replaced Bell & Howell, after competitive bidding, in November 1967.

i/ Funded under "Higher Educational Activities - College library training and Research" in 1967; and "Research and Training - Library Improvement Research" in 1969.

The National Science Foundation Curriculum Commissions

Another special performer of education research and development is the NSF curriculum commissions. Under this designation are the college science commissions now active in agriculture, biology, chemistry, engineering, geography, geology, mathematics, and physics. Also included would be a number of continuing committees, study groups, and commissions operating at the pre-college level. Groups such as the School Mathematics Study Group (SMSG), the Physical Science Study Committee (PSSC), the Commission on Science Education, the Biological Sciences Curriculum Study (BSCS), and the Chemical Education Material Study (CHEM Study) illustrate the range of commission-type organizations which have been active with NSF support at the pre-college level.

The primary aim of the commissions is to update the content of science and mathematics instruction. The college commissions attempt, in addition, to bring to bear on the instructional process the spirit of inquiry which marks creative research since one of the aims at this level is to bring undergraduate instruction close to research frontiers.

The commissions and study groups use their members as well as panels, committees, national and regional conferences, and other activities to accomplish their objectives. The pre-college groups are much more heavily oriented to full-course materials development; the undergraduate commissions also engage in development work but aim more toward the production of modules designed to teach particular concepts or develop inquiry skills in a particular aspect of science or mathematics.

Research Division, National Education Association

The Research Division of the National Education Association is actively engaged in investigating current educational problems and supplying current educational information. It employs a professional staff of over 20 people backed by almost twice as many clerical, secretarial and statistical workers. The Division's efforts provide an important supplement to the U.S.O.E.'s statistical program through their annual Estimates of School Statistics and Selected Statistics of Local School Systems. Selected titles of recent research reports include Salary Schedules for Teachers, 1968-69, Ability Grouping, The Rescheduled School Year, Evaluation of Teacher Salary Schedules, 1966-67 and 1967-68, and Class Size (all published in 1968). The titles indicate the scope of the Division's efforts and illustrate their intent to produce not just statistical treatments, but substantive and interpretative studies as well.

Dollar Volume of Performer Activity

All agencies and organizations described in this chapter fit into one or another of the categories presented in Table 7. The altering patterns of support by USOE of various instrumentalities for performing educational research is illustrated in Table 8. The tables are based on material developed in connection with the substantive analysis presented in Chapter VIII. The manner in which they were derived is described there. It should be noted that the figures presented constitute documentable funds only. Actual figures may be somewhat higher, but the figures here can in no case be an over-estimate.

Summary

As this chapter suggested at its outset, the numbers and types of performing institutions and agencies in the field of educational research and development are even greater than the array of sponsors.

Colleges and universities carry out a large portion of the effort. Regional educational laboratories, a new institution drawing on a variety of competencies and institutions for their governance and their work, account for the second largest performance funds. A considerable number of other center-type programmatic R&D activities are in the Bureau of Research R&D centers, the National Laboratory for Early Childhood Education, the Educational Policy Research Centers, the Vocational and Handicapped Children Research Centers, and the Head Start Evaluation and Research Centers.

Nonprofit organizations such as the American Institutes for Research and Educational Testing Service, regional associations like SREB and WICHE, and the NSF Curriculum Commissions also play important roles. State and local educational agencies are becoming increasingly involved as a consequence of the new evaluation responsibilities required in connection with Title I and III of the Elementary and Secondary Education Act of 1965.

Mechanisms for coordination, dissemination and diffusion exist in the Research Coordinating Units, the Instructional Materials Centers, ERIC, and the educational laboratories.

All of these agencies and institutions perform different kinds of responsibilities. Some were deliberately designed to carry out new or special responsibilities and functions. Across the range of them, they imply the existence of varying strategies or tactics in the support of management of educational research and development functions.

TABLE 7. Support by Performing Institution, FY 1968
($ thousands)

CATEGORY	USOE	NSF	NIMH	NICHD	DOD	OTHER FED. AGENCY	FOUNDATION & OTHER	TOTAL
Regional Educational Laboratory	22,793	-	-	-	-	-	-	22,793
University-Based Research and Development Centers (incl. Voc. Ed., NLECE, and HCY)	15,419	-	-	-	-	-	-	15,419
College or University	40,849	20,415	9,669	6,629	2,815	3,656	7,810	91,843
Policy Research Centers	999	-	-	-	-	-	-	999
ERIC Clearinghouses	1,762	-	-	-	-	-	-	1,762
ERIC, Other	1,083	-	-	-	-	-	-	1,083
Profit-making Corporation	1,825	-	399	485	539	315	120	3,683
Non-Profit Corporation	9,393	2,911	1,356	1,168	718	1,409	3,260	20,215
Local Education Agency	2,527	-	96	19	-	427	248	3,317
State Education Agency	2,666	-	4	76	-	40	513	3,299
Other Government Agency	567	-	336	-	1,974	878	116	3,871
TOTALS	99,883	23,326	11,860	8,377	6,046	6,725	12,067	168,284

TABLE 8

Historical Analysis of USOE Support to Various Performer Categories ($ thousands)

CATEGORY	UP TO 1964	1965	1966	1967	1968	TOTALS
Regional Educational Laboratory	-	-	7,336	18,543	22,793	48,672
University-Based Research & Development Centers (incl. Voc. Ed., NLECE & HCY)	999	3,493	6,579	14,188	15,419	40,678
College or Univ.	58,354	24,516	50,085	38,792	40,849	212,596
Policy Research Centers	-	-	-	600	999	1,599
ERIC Clearinghouses	-	-	1,768	2,050	1,762	5,580
ERIC, Other	-	-	202	1,000	1,083	2,285
Profit-making Corporation	540	0	336	835	1,825	3,536
Non-Profit Corporation	10,735	3,717	6,552	6,821	9,393	37,218
Local education Agency	2,920	1,205	2,467	1,414	2,527	10,533
State education Agency	3,302	3,350	5,205	4,284	2,666	18,807
Other government agency	1,148	86	266	147	567	2,214
TOTALS	77,998	36,367	80,796	88,674	99,883	383,718

Chapter VI

THE MANAGEMENT OF EDUCATION RESEARCH AND DEVELOPMENT

A survey of the present status of educational research and development in the United States must include consideration of management and decision-making strategies employed by sponsors of educational R&D. The focus on management arises quite naturally from the need (1) to identify goals and priorities, (2) to derive specific objectives, consider alternatives and allocate resources, (3) to administer projects and programs which result, and (4) to evaluate the findings and products.

A Rationale for Policy Management for Educational R&D

Like the models of research and development presented in Chapter I it is important to present as explicitly as possible the conception of management which provided the structure for studying the areas covered in this report, reviewing the literature, and conducting interviews with important policy makers in educational research and development. Since responsibility for drafting this document rested in the U.S. Office of Education, the rationale presented here is very much an outgrowth of recent USOE experience. While it is possible that in one or another respect the analysis may have special relevance only to the kinds of problems which USOE has encountered, the general requirements explored would appear to have fairly universal application. The development of workable theories of research management is still very much ahead of us;[1] the rationale presented here, therefore, is built on an empirical rather than theoretical base.

Management and decision-making in educational R&D provide a convenient point of focus for considering three important strands of thought. These are (1) the several conceptions of the nature of research and development, (2) the mission of educational research and development and (3) the range of questions raised by the use of science in support of social and political ends. What a sponsor considers research and development for education to be, what he determines its ultimate goal to be, and how he understands the special problems and issues associated with employing behavioral, social and other sciences to improve a major social and cultural activity will all significantly shape the problems he identifies, the procedures he employs, and the decisions he makes.

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[1] See, for example, O. Morgenstern, R.W. Shephard, and H. Grabowski, "A Graph Oriented Model for Research Management," Research Program Effectiveness, ed. by M.C. Yovits, et al. New York: Gordon and Breach, Science Publishers, Inc., 1966, pp. 187-215.

The principal reason for managing research and development for education, of course, is the reason for managing anything: to achieve the objectives set for the program at acceptable levels of financial and manpower cost and within the desired time limits.

The following kinds of activities are embraced under the general heading of managing research and development for education:

- Identifying the overall goal and clarifying basic assumptions
- Identifying the priorities
- Identifying R&D goals
- Identifying specific objectives
- Choosing among alternative project and program activities in terms of service to goals and objectives
- Implementing and monitoring specific projects and programs
- Developing and sustaining communication networks to insure appropriate and adequate information flows for planning purposes
- Developing appropriate data input mechanisms for planning, and feedback mechanisms for program evaluation
- Providing, identifying and recruiting supplies of appropriately trained manpower
- Evaluating the impact of R&D in terms of the overall goal of the program

All of these functions are developed in greater detail below in the six sub-sections which follow.

Levels of Analysis for Decision-Making

Many different levels of analysis exist for managers of educational R&D. Clearly distinguishable levels can be identified at which alternative priorities, goals, objectives, or means can be considered. One can, for instance, distinguish between generalist and specialist level of analysis. Generalist levels deal with questions of broad social and educational policy; specialist levels deal with technical and professional concerns. The two are not always wholly separate from one another.

Generalist concerns can be approached from at least three different levels. On the highest level, for example, educational policy makers might be asked to consider alternative mixes of support for direct operation of educational programs as contrasted to resource building activities aimed at ultimately affecting direct operations (e.g., manpower training for professional and sub-professional roles in education and instruction, dissemination of information, research and development, etc.).

An example of a second level of generalist concern is weighing the allocation of resources within the category of resource building. Here the question of how much ought to be directed to research and development, or professional training, or dissemination would be addressed.

Still other levels might be represented by questions aimed within the research and development field. What are the basic assumptions behind R&D and what is its overall goal? What major educational or social priorities should provide focus for educational R&D? What R&D goals emerge from those priorities? What R&D objectives serve those goals? For these kinds of questions both generalist and specialist competencies are required.

Among the basic assumptions that must be clarified are those having to do with the nature of research and development and the direction and rate of program growth. Definition of overall goal is critical, too. It provides the basis for assessing whether the activities supported under the program are, in the long run, having the effects intended. The way in which the goal is stated is therefore very important. Quite different consequences flow, for example, from stating the goal of the educational R&D programs in terms of "supporting research on education and learning" as contrasted to, say, "improving instruction and the process of education."

Once the broad goal for the program is identified,then areas of priority must be identified. The large number of problems or potentialities, both short and long term, which might be served through educational R&D clearly exceeds by many times the available money and manpower resources. Priority choices, therefore, must inevitably be made. Identifying priority areas has the effect of defining some boundaries within which the establishment of R&D goals can be guided and specific objectives delineated.

The number of possible goals and objectives for research is so vast that some limitation of the areas of consideration must be accomplished before specific alternatives are conceived and explored.

The delineation of specific R&D objectives, therefore, is a fourth level of program determination after over-all goal, priorities, and research and development goals. At this level is identified what specific improvements are to be developed, what specific areas are to receive research support, what specific answers are to be provided to educational policy-makers, or what the targets for dissemination or demonstration are to be.

At these levels of analysis highly specialized competencies need to be brought into play together with the generalist concerns. For example, at the point where R&D goals and objectives are identified, combinations of generalist, educational specialist, and scientific and technical competencies must be called upon.

An illustration of how this might operate can be given using a hypothetical priority area. Suppose that an inductive examination of social needs and requirements, manpower goals, and the educational system leads to the generalist judgment that vocational, technical, and occupational education is a priority concern. Once this judgment is arrived at, it then becomes necessary to develop now via deductive processes a set of potential R&D goals. This requires the participation not only of generalists but of individuals who know research and development that would be relevant to the priority area in question. An example of a goal in this area might be to provide learning-effective curriculum packages in a designated number of curriculum areas in vocational-technical education.

Once the R&D goals are identified, a much deeper analysis, now inductively pursued, must be made to assess the exact present capabilities and requirements in order to determine what the specific research and development objectives must be. A knowledge of the present state of the art about learning and motivation, about instructional technologies, the organization and administration of vocational education, the entry level performance requirements for various occupations, and so on are essential to program planning and development at this level. Thus, for priority setting, goal identification, and the delineation of R&D objectives combinations of generalist and specialist competencies are mandatory.

Finally, when the actual administration of program begins, the competencies required lean increasingly in the direction of the scientific, the technical, and the managerial. In other words, once the goals have been determined and the specific objectives identified, predominantly scientific, technical, and administrative concerns (exactly what type of research or development program to mount, what kinds of people and instrumentalities to support, and the like) become the major concern.

Figure 1 develops schematically an estimate of the proportion of generalist as contrasted to specialist competencies required at each of the several levels of analysis. The representation must be seen as approximate only, but it does provide a convenient short-hand way of expressing the points being made.

Data Bases for Identification of R&D Priorities and Objectives

Defining the different levels of program analysis provides one perspective for viewing educational R&D management. Equally useful is an understanding of the several information bases required for planning and decision-making.

Specific ideas for research and development projects, of course, emerge from the minds of individuals scattered throughout the research, development, and educational communities. It is important, therefore, to identify the information that needs to be collected, to encourage such ideas, and to choose wisely from among the alternatives which thus emerge.

Four kinds of information must be collected, analyzed, and synthesized as the backdrop for planning, decision-making, and managing educational research and development. They are:

- Information on the present status, progress and performance of the educational system compared with the stated objectives of that system
- Information on existing social needs, demand, and conditions
- Information on alternative futures for education and society
- Information on the health, progress, and current levels of knowledge existing in and across the many academic disciplines of relevance to instruction and education. (A related piece of information required is our understanding of the ways in which knowledge about learning can be translated into instructional systems, practices, and organizations.)

1. Objectives and Performance

One way of uncovering R&D priorities in education is by comparing the actual performance of our educational institutions with the stated objectives for education. Discrepancies between objectives and performance become highly visible stimuli for developing research and development priorities. Even the discovery that goals or objectives

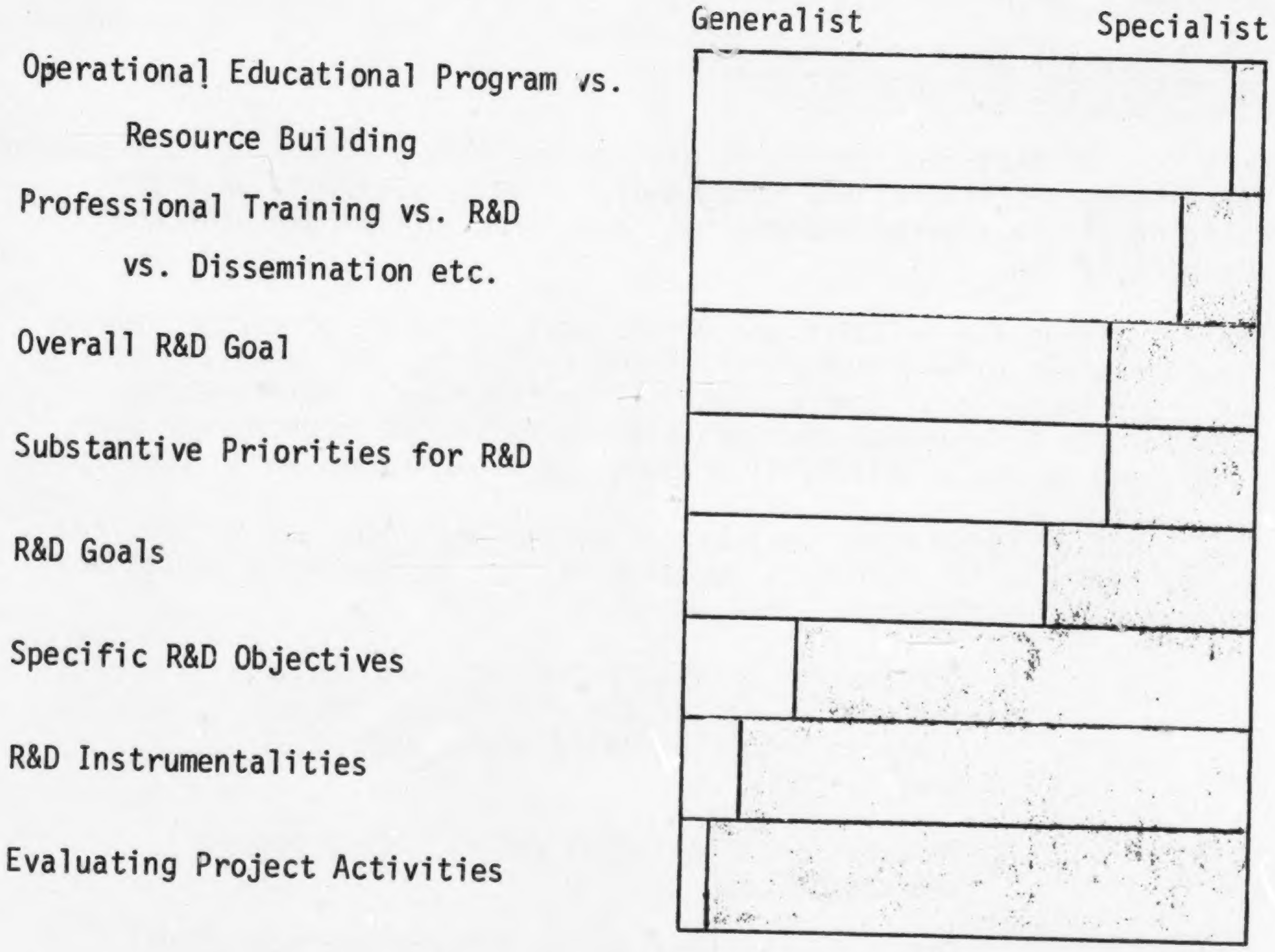
Generalist
Specialist
Operational Educational Program vs. Resource Building
Professional Training vs. R&D vs. Dissemination etc.
Overall R&D Goal
Substantive Priorities for R&D
R&D Goals
Specific R&D Objectives
R&D Instrumentalities
Evaluating Project Activities

Figure 1. Schematic Diagram Fstimating the Ratio of Generalist to Specialist Competencies Required at Different Levels of Decision-Making Respecting Educational Research and Development

are stated in such global terms that performance cannot be measured may be cause for further refinement and analysis (perhaps, indeed, leading to research and development dealing with instrumentation for assessing educational output). As a minimum, however, comparison of what educational institutions are trying to accomplish (their objectives) with what they are actually accomplishing (their performance) is an essential component of the analytical base required for meaningful research and development decision-making.

Knowledge of objectives and performance is useful at both generalist and specialist levels. The degree to which the schools, for example, have been able to provide equal educational opportunity, as measured by results, may relate to a number of generalist concerns dealing with the level of support for R&D, the distribution of funds among R&D functions, or the allocation of R&D funds among priority areas. Alternatively, on the specified level, analyses of school performance may suggest hypotheses about how to reallocate or redesign present instructional resources.

2. Social Needs and Requirements

Even if educational and instructional objectives were stated concisely and explicitly, and schools were achieving the objectives with a high degree of proficiency, it is conceivable that such an accomplishment might be irrelevant for the society as it then exists. A highly efficient educational system achieving inappropriate objectives would represent real problems for any society. Discrepancies of this kind can be discovered only by comparing the stated objectives and the performance of the education system with an understanding of the economy, technology, politics, and values of the society as a whole. It is important, then, as a second base for decision-making and management of R&D, to have available (or to cause to exist) the kinds of analyses which will permit policy makers to judge the present relevance of the educational system to local, regional, and national (and now increasingly international) needs and requirements.

3. Alternative Futures

A third kind of data which managers of educational research and development require is derived from the systematic consideration of alternative futures for both education and society. Dennis Gabor in Inventing the Future reminds us that in our personal and professional lives, each of us is engaged daily in the process of inventing the future.[2]

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[2] Dennis Gabor, Inventing the Future. New York: Alfred A. Knopf, 1964.

His point bears special poignancy for the educational R&D manager, for today's research and development may in no small degree shape -- and indeed create -- many of the instructional and curricular options available to us in the future.

R&D managers, therefore, must utilize data derived from the responsible employment of a variety of projective techniques to examine the determinants and implications of current trends, to analyze the long-range consequences of the alternative decisions confronting us now and in the immediate future, and to explore the desired future states that we might wish to achieve and the routes by which it might become possible for us to achieve them.

4. State of the Art

Finally, a fourth kind of knowledge to which R&D managers must have access relates to what is commonly termed the "state of the art" in the several disciplines relevant to learning and education. This encompasses continuing surveys of progress in the disciplines relating to education. It also means the ongoing analysis of strategies, tactics, and techniques by which knowledge and theory are translated into practical applications, made available to educational institutions, and actually installed in operating programs.

What do we know, for example, about the impact of socio-economic variables on learning? What is the current level of understanding about the biochemical processes associated with memory and learning? At what levels and what degrees of confidence can we characterize our understanding of the importance of motivation, of sequencing, or of cognitive style in the learning process? What do we know about the psychomotor process we call reading? These questions and many more like them need to be asked and answered periodically to establish benchmarks in the accumulating knowledge base of importance for education.

Similarly, educational R&D managers must also constantly appraise their evolving understanding of the processes by which knowledge about learning and instruction is translated into usable practices and made operationally available to educational institutions and programs. What do we know about the technology of instruction and the process by which we convert theoretical knowledge about learning into effective professional practices? What do we know about change processes in education, about the diffusion of tested and validated innovation throughout our educational institutions? How might that knowledge affect our models of R&D or the ways in which we go about supporting or performing it? Some of these questions relate to dissemination, some relate to the process of development, others relate to larger questions of the diffusion of innovation. Up-to-date understanding in such matters is essential to the educational research policy-maker and manager.

Taxonomic Considerations

Besides developing a firm understanding of generalist and specialist levels of program analysis and insuring access to several kinds of basic data (about educational outputs, social needs, alternative futures, and current levels of knowledge in disciplines relevant to education and about change processes in education), the R&D manager must also address his attention to a number of taxonomic problems. Program control requires the development of descriptors useful for analyzing and allocating resources. Problems arise because there are many possible dimensions of analysis.

The taxonomic dimensions which may be useful to the managers of educational research and development require careful definition. Some may be more powerful organizers than others. These dimensions (some of which have been used in Chapter VIII as the basis for presenting a descriptive analysis of R&D efforts currently underway) may be organized around research function (e.g., conclusion-oriented and decision-oriented research, development, dissemination, demonstration, manpower training, etc.), age-grade level, target groups, performing institution, discipline of principal investigator or within which a given activity is being conducted, or sets of categories peculiar to the field of education, such as curriculum, instruction, educational professionals, pupil personnel services, and the like.

Some dimensions of analysis may suit the entire range of the program. Others may be more suitable for the analysis of only one or another part of the program. But all such dimensions constitute more or less useful analytical structures for R&D managers, provided, of course, that the categories identified are meaningful and accurate. They become even more useful as decision-makers become able to identify and justify hierarchies of dimensions in terms of R&D priorities to serve as guides to the development of program.

Data Flows and Communication Nets

The analysis of generalist and specialist concerns and the requirements for certain kinds of information for planning and decision-making purposes make it incumbent upon R&D managers to establish continuing data flows in to research sponsors, researchers, professionals, and policy makers, and out from research sponsors to performers and educators. Because of the large number of different sources of data for priority determination and because of the equally large number of potential problems which may compete for R&D resources, the educational R&D manager has a particularly difficult time coping. Taxonomic considerations will provide some help, of course, as will the continuing analysis which ultimately leads to priority choice and the delineation of R&D objectives. But in order to maintain both the accuracy of the taxonomies and the meaningfulness of priority analysis, continuing data flow into the planning and program development mechanism must be assured.

Information flow outward must also be good. Performers of all types need to know what the priorities are. They need to be aware of where their assistance is being sought and what kinds of activities are being undertaken. In addition to assuring appropriate responses from the communities of performers of educational R&D, outward communication also insures the stimulation of feedback to R&D managers regarding the adequacy of priorities and the "rightness" of the programs proposed to serve those priorities.

Manpower Supply

One of the particularly critical problems for the educational R&D manager is identifying, recruiting, and, if necessary, training the supplies of manpower required to perform the activities for which he is responsible. Manpower must also be sought to provide the technical and scientific expertise necessary for deciding on the merits of particular activities that may be proposed.

A considerable number of disciplines have relevance to instruction and education. The lack of careful definition of the various functions that comprise R&D and the skills requisite for the pursuit of each constitutes an additional complicating factor. After the roles are specified, availability of such people needs to be ascertained. If sufficient supplies are not available, training programs must be mounted.

Manpower requirements can be perceived in two ways. First, educational research and development programs require trained scientific and technical manpower to perform the many types of activities required to carry out a sustained, productive R&D effort. The range of competencies required may be considerable, not only for scientists from a broad range of disciplines, but also for support personnel in the form of technicians, dissemination specialists, and the full range of skills required for educational development.

Second,manpower is required for management purposes. The particular responsibilities of managing R&D, of course, require specially trained personnel, too. More importantly, however, effective education research management requires the identification and participation of personnel from the general public, the education professions, the academic disciplines, business, industry, and the economic sector. They are the sources of data required for establishing priorities, goals, and objectives and their meaningful involvement in the program is essential.

Program Administration: Monitoring and Implementation

The immediate confluence of ideas about research and development models for education and our understanding of social and behavioral science policy occurs at the juncture of actual program administration.

If distinctions can be made between research and development, does that distinction require careful identification of different kinds of instrumentalities for carrying out one or the other? Should the granting and contracting instruments vary, and should the type of monitoring required for each kind of activity also be determined accordingly? What is the proper role for scientific and technical personnel in the actual administration of the R&D effort? All of these questions and many more like them require the careful attention of the R&D manager.

For example, specifying the objective of conclusion-oriented research as the production of new knowledge underscores the importance of the scientific community itself in making determinations about what projects are in fact well conceived and likely to advance the state of the art in a particular discipline. Furthermore, an understanding of the way in which science actually proceeds (certainly not the neat orderly press of events that traditional teaching in the sciences would lead us to believe)[3] means careful consideration must be given to the ways in which funds for research actually are administered. Principal attention, perhaps, ought to be directed to the competence of the investigator and less attention to the detailed monitoring of work in progress. In the advance of knowledge, more explicit dependence should be placed on the canons of responsibility which the investigator himself may feel and which will surely be applied by his peers upon publication of his work.

For development, dissemination, demonstration, and training, however, quite different standards apply. Administrative and managerial procedures, particularly as applied in the case of project selection and monitoring, will vary accordingly. Unlike research, the products and purposes for engaging in development or demonstration can be identified with considerable specificity. This permits and indeed demands much closer monitoring to insure that intended products or services are in fact being produced or performed. While scholarly concerns by no means drop out of play within these other functions, they are necessarily joined by other kinds of managerial and technical skills which play an increasingly important role in evaluating the worth and effectiveness of the projects and programs receiving support.

One of the key managerial responsibilities, therefore, is the identification of appropriate kinds of technical expertise to evaluate proposals and projects prior to support, to assess their continuing value as they are carried out, and to judge their value upon completion. Insuring an adequate supply of such expertise is absolutely essential if research managers are to have the best advice when actually monitoring supported activities. As has been suggested, however, scientific competence is not the only kind of expertise which should be made to flow into the policy and administrative councils of the R&D program. It is necessary, particularly in regard to the development and demonstration responsibilities of the research program, that the flow of the best advice from school personnel, educational administrators, and the lay public (including political leadership) be secured to an equal degree.

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[3] Cf. Thomas S. Kuhn, The Structure of Scientific Revolutions. Chicago: The University of Chicago Press, 1962.

Technical competence, of course, is not the only way in which activities of the R&D program may be evaluated. When research finds its way into development and is then operationally validated by the successful application of the products of those development efforts, the research has received a kind of evaluation which in the long run is the most important it will get. Similarly, the rate of adoption of the products of development testifies to the adequacy with which they have been geared to the real needs or desires of school personnel and the general public.

Finally, mention should be made under this sub-heading of the need to insure proper measures of program stability. The central factors here are quality of work and steadfastness of purpose. In order to achieve objectives, management must first identify them. But it must also insure (1) that efforts are sustained long enough to accomplish the objectives and (2) that the program as a whole does not suffer from the pressures on all discretionary programs to shift foci to reflect the apparent priorities of the moment.

Management Strategies for Educational R&D

A conceptual analysis can only be background, however, for the consideration of what sponsoring agencies and organizations now do in the course of exercising their responsibilities. Actual procedures for managing educational R&D programs are quite varied.

In an attempt to explore the ideas which underlie program management and the techniques of management which are actually employed, extended interviews were conducted with program managers in various Federal agencies, private foundations, State educational agencies, college and university environments, and major research and development organizations. (A full list of the individuals who were interviewed for this policy review and their affiliations at the time of the interview is presented in Appendix B.)

The Federal Agencies

Discussion of the management strategies of Federal agencies is divided into four parts. Individual treatment is given to the U.S. Office of Education, the National Science Foundation, and the Office of Economic Opportunity. The remaining Federal agencies sponsoring educational or related research and development activities have been grouped together because of the general similarity of the procedures and strategies they follow.

The United States Office of Education

The key units of the Office of Education to consider in the description of management strategies for educational research and development are (1) the Bureau of Research and (2) the Division of Research in the Bureau of Education for the Handicapped. Well over 90 percent of the research appropriations available to the Office of Education are administered by these units. While the Institute for International Studies, the Office of Program Planning and Evaluation, the National Center for Educational Statistics, and the Division of Vocational and Technical Education all have some responsibility, this analysis concentrates on the two major programs administered by USOE.

1. Bureau of Research

For the first ten years of the Cooperative Research Program (1957-1967) the strategy of the research program of the Office of Education was to focus predominantly on mechanisms and instrumentalities for research although substantive research areas were identified from time to time.

Prior to July, 1965, USOE research programs were administered under a panel arrangement. Unsolicited proposals were assigned to standing panels in such areas as curriculum improvement, demonstrations, psychological processes, environmental influences on learning, and research and development centers, where they were reviewed and funding decisions were made.

Early efforts focused on project research, but in the early 1960's new departures took the form of support first for curriculum improvement centers with five-year lifespans and then for research and development centers. In 1964 the organization of ERIC and in 1966 the formation of the regional educational laboratories marked continuation of this approach.

Since the summer of 1965, however, the newly formed Bureau of Research has undergone a series of evolutionary developments. Some of these were directly related to the dramatic expansion of financial resources available for R&D that occurred between FY 1965 and FY 1967. Others were more closely tied to the accumulation of managerial understanding about the nature of R&D for education.

Shortly after the full-scale reorganization of the Office of Education that took place on July 1, 1965, a determination was made to alter the management arrangement for the Office's research programs. All the research programs were brought under one managerial roof excepting the responsibilities of the Office of Program Planning and Evaluation and the activities of the National Center for Educational Statistics, also established within USOE at that time.

Dissatisfaction with the existing panel structure led to the adoption of procedures which have remained intact in their broad outlines up to the present time. In essence what happened in July, 1965, was the assumption by Office of Education of responsibility for the subtantive guidance and direction of its research and development programs.

Concern over the previous arrangements for administering research grew out of three conditions. One was the observed degree to which the research efforts were not, at that time, contributing as directly to the improvement of instruction and education as was desired. The second was a perceived difficulty in altering the situation in any substantial way given the existing arrangements for proposal review and program development. The third was the difficulty of securing sufficient competence on any one panel to review the full range of proposals sent to it.

Accordingly, new procedures were adopted. Standing panels, with the exception of the **Research** Advisory Council, were discontinued. To replace them, a system of paid field readers was devised which permitted individual panels to be selected for mail review of the proposals submitted to USOE for potential funding. USOE began actively to stimulate activities and to experiment with formal requests for proposals.

To supplement the external review procedures, an Internal Review Committee was established to perform the functions of proposal review and program development. After slightly more than a year of functioning, however, this mechanism proved inadequate, and it was allowed to lapse. The original intention had been to use the committee as a central coordinating mechanism for research in the Office by drawing its membership from the Bureau of Research, the operating Bureaus in USOE, the National Center for Educational Statistics, and the Office of Program Planning and Evaluation. The size of the committee, the frequency with which it had to meet, and the amount of business it had to transact had the effect of turning its sessions into fairly perfunctory meetings.

During the course of the months which followed the demise of the Internal Review Committee, other mechanisms for developing program coordination with other Bureaus and staff offices were tried. These included the establishment of several kinds of task forces with membership drawn from throughout the Office as well as the direct solicitation of research requirements from Bureau and staff office directors.

The present management of the Bureau of Research is advised by a Research Advisory Council whose members are appointed by the Commissioner, subject to the approval of the Secretary of Health, Education, and Welfare. The functions of this council are to advise the Commissioner of Education and the Associate Commissioner for Research on the policies, program, and procedures of the research programs of the Office of Education and to review budget requests and proposed and actual allocations of funds (a full statement of their functions can be found in Appendix A).

The involvement of the Council has become central to the program development responsibilities of the Bureau. They were, for example, intimately involved during calendar 1968 in the drafting of a goal and priority statement for the Bureau designed to serve as the basis for the five-year planning exercise in the spring of 1969.

The administrative and review procedures of the Bureau are currently undergoing re-examination. Several of the studies of the Bureau of Research (see Chapter X) have made recommendations regarding the review procedures, especially for fundamental research activities. For example, under the direction of the Research Advisory Council, the Bureau is currently preparing policy proposals relating to the re-introduction of a modified standing panel structure with particular reference to the basic research responsibilities of the Bureau.

A considerable number of other advisory mechanisms also exist within the Bureau. A National Advisory Committee on the Educational Laboratories provides guidance to USOE staff on the particular policy needs and requirements of the regional educational laboratories and research and development centers. Ad hoc committees advise on secondary curriculum efforts, vocational research priorities, and special projects or programs which the Bureau may at any time be pursuing.

During FY 1969, program development responsibilities of the Bureau have been met in two ways. The first set of activities was instituted in July, 1968. Task forces were established, drawing their membership primarily from the Bureau of Research but including personnel from other Bureaus and staff offices in USOE. The groups were organized on the basis of categories like instructional systems, home and community factors, student characteristics, facilities and equipment, educational personnel, organization and administration, information transfer and use, urban education, and research training and other resource building activities. Not all of the groups were mutually exclusive. Their instructions were simply to generate ideas for research and development. These ideas were to be based on the present state of the art in their respective areas in terms of educational needs and priorities as the task force members saw them. At the same time, as the period of idea generation was going on, the Bureau leadership (with the participation of other Bureau leaders) and the Research Advisory Council embarked on a six-month long effort to define goals and priorities for research. The intention was then to build an integrated programmatic series of program proposals using the identified priorities as the basis for sifting through the ideas which had been generated during the summer and early fall. Considerable attention was paid to new planning techniques, especially the convergence technique[4] first used in the National Cancer Institute. At least one extended session involving Bureau personnel has been held to focus on the area of early learning in an attempt to explore the implications of this procedure for educational research and development planning.

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[4] Louis M. Carrese and Carl G. Baker, "The Convergence Technique; A Method for the Planning and Programming of Research Efforts," Management Science, Vol. 13, No. 8, April, 1967.

The second set of activities began before the first set had run their full course. Much of what had been accomplished, however, was usable in the second run. With the advent of the Nixon administration, planning procedures throughout the Department of Health, Education, and Welfare were altered. Task Forces were established at the Departmental level to review and plan all programs. A Research Task Group was established drawing its membership from the Bureau of Research, the Office of Economic Opportunity, the Office of Science and Technology, the Division of Research in the Bureau of the Handicapped; and the planning and budget staffs of the Department. A planning framework was generated, based on a combination of research functions and educational levels; and working sub-committees have been established to prepare a program review and new suggestions for FY 1971.

All of these program development activities are designed to link with the established planning procedures for the Office of Education as a whole. These in turn tie into the Departmental structure. Once decisions are made at the USOE and DHEW levels, proposals are made to the Bureau of the Budget in the Executive Office of the President. The ultimate step is the presentation of budget proposals to the Congress of the United States.

The steps outlined above are not unlike those which every Federal agency goes through. In practice, they are much less systematic than they might otherwise seem. While formal transmissions of budget and program proposals do proceed with a certain if not inexorable logic, the actual decision-making procedures often (and this is by no means peculiar to the Office of Education) display somewhat less than a logical or regular character. Planning activities have not always interfaced well with budgeting requirements. In fairness it should be said that fault for this cannot be laid at any particular doorstep, particularly since new, and fairly complicated, procedures have recently been adopted (planning-programming-budgeting structures) for these functions.

All during the planning and budgeting process, decisions are, of course, being made which require recasting of earlier decisions. It has often been difficult to sustain intended program thrusts in the presence of swiftly emerging budgetary or program constraints. (This factor was one of the strong motivating forces behind the Bureau's and Research Advisory Council's interest in developing a precise statement of priorities and R&D objectives.)

A considerable amount of the Bureau's energy in recent months has been absorbed by three kinds of activities which bear directly on questions of management strategy. The first of these has involved the careful delineation of the several missions on which the Bureau needs to work if it is to make progress toward the achievement of its overall goal, the continuous improvement of instruction and the educational process. The extensive commitment of manpower within the top levels of the Bureau to the analysis and development of statements and understandings in this has culminated in the identification of five missions.

These are:

- To create, develop, or identify instructional materials, practices, organizations, and environments for schools, colleges, universities, and other educational programs which represent substantial and measurable improvements over those currently employed.
- To produce the knowledge required for the continuous improvement of materials, practices and environments.
- To promote the spread and utilization of knowledge about instruction and the educational process.
- To expand and/or build the individual and institutional capabilities necessary for carrying out the first three missions.
- To demonstrate tested and validated research-based practices, materials, organizations, and environments.

A second activity which has absorbed a major portion of the Bureau's energies has centered on the instrumentalities the Bureau has identified, created, or used to carry out its several missions. The kinds of questions which have been raised and discussed are: (1) the role of the educational laboratories and R&D centers; (2) the manner in which they are supported; (3) the degree to which such forms of programmatic or institutional support are compatible with the identification and service of substantive educational research and development priorities; and (4) the need to create such institutions to build capabilities which would not otherwise exist in the Nation. These issues are nearer solution than previously since they have been forcefully raised and are now being actively debated. Bureau and other USOE and DHEW officials admit to the complexity of the problems which are involved, but they are all committed to making substantial progress toward their resolution.

The third activity which has consumed considerable management time has been the improvement of the planning and program development process itself. This has proven to be extremely difficult for the Bureau.[5] As understanding about the range and character of the Bureau's goal and missions began to be refined, the complexity of the Bureau's responsibilities in planning and developing research and development objectives and priorities has become increasingly clear. Many different kinds of competencies are required. Many different kinds of interests need to be served by and through the planning procedures. Inventing ways to accomplish this has taken much of the Bureau's time and energy. The process is an ongoing one. Indeed, even undertaking the development of this report has been one of the substantial activities in this regard.

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[5] Cf. Erich Jantsch, Technological Forecasting in Perspective, (Paris: Organization for Economic Cooperation and Development, 1967), Chapter 1.7 on the difficulty of selecting goals for social technology, a realm in which educational research and development is clearly a subject.

The Bureau is convinced on the basis of its experience over the past four years that it is extremely unlikely to make much progress in terms of achieving its overall program goal unless it does two things. It must (1) devise ways to refine much more sharply its intermediate R&D goals and objectives and (2) do so in ways which engender the support and cooperation of the research, education, and political communities to a much greater degree than it has in the past.

To summarize, the management strategy of the Bureau of Research has focused on (1) the clarification of missions, (2) the careful consideration of the instrumentalities available and necessary for the conduct of educational research and development activities, and (3) the improvement planning priorities, setting objectives, and developing program procedures.

2. Division of Research, Bureau of Education for the Handicapped

The Bureau of Education for the Handicapped is implementation oriented; the Division of Research is conceived very much as an operating arm of the Bureau. Because of their mission of service to handicapped children, the Division of Research has adopted the posture that the activities they support must be of an applied nature. The devision has defined applied research as "efforts involved with the discovery and refinement of information which relates directly to educational programming for the handicapped. Related activities include efforts to assure implementation of the information developed in the research program."[6] Among related activities the division includes dissemination, demonstration, curriculum, and media.

In adopting this forthright posture toward implementation, the division has addressed itself to the failure of research in the past to provide either the information or the impetus to assure the development of optimal programs of special education to service the needs of handicapped children. The guidelines issued by the division require applicants to identify the particular educational problem for which they are seeking a solution and to indicate how the attainment of the goal of that project will in fact be an important step leading to the solution of the identified problem. Models of research support developed by the division place no emphasis on fundamental studies in education and concentrate heavily on applied research and demonstration activities.[7]

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[6] "A Conceptual Model for Educational Research Support," Division of Research, Bureau of Education for the Handicapped, p. 4.

[7] *Ibid.*, p. 4-5.

The applied orientation of the program is one major factor underlying its management strategies. A second is the phenomenal growth of the program. Between FY 1964 and FY 1969 the monies available for handicapped research have increased from $1 million to $15 million.

The effect of this expansion has been to focus the attention of the Division of Research on questions relating to the impact of research activities, the availability of sufficient talent to carry out the many purposes of the program, and the degree to which institutions in the field are organized to carry out the identified research and demonstration functions of the program.

In the development of program the Division of Research utilizes its own Research Advisory Committee as well as the National Advisory Council on Education for the Handicapped, a legislatively created committee advisory to all the programs of the Bureau of Education for the Handicapped. Ad hoc panels are used by the Division of Research as well as a field reader system for external review.

Considerable attention has been given in recent months to the creation and support of institutions designed to carry out the research missions for handicapped children. The fourteen Instructional Materials Centers, the two (soon to be three) research and development centers, and the recently announced program for the creation of five experimental regional resource centers[8] all give testimony to the concern of the managers of this program over the availability of institutions capable of carrying out educational research and demonstration responsibilities for handicapped children.

Concern for cumulative impact, for the lack of integration of research efforts, for the absence of specific attention to dissemination and implementation efforts, and for the training of research and demonstration specialists has stimulated interest in institutional capability. It has led the Division of Research to consider many of the same kind of issues which have occupied the attention of USOE's Bureau of Research.

The National Science Foundation

The principal points of focus for considering the management strategies applied to educational research and development in the National Science Foundation are the course content improvement activities, supported at the pre-college and undergraduate level, and the research and development activities of the program supporting the use of computers in education and research. There are other research activities relating to education which the Foundation supports; these, however, are associated with their more general mission of support for basic science and are more an after-the-fact phenomenon than the result of any deliberate strategic design relating to the improvement of education.

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[8] The regional resource centers are designed to develop and apply the best methods of appraising the special educational needs of handicapped children and to assist in meeting those needs.

Since the late 1950's the National Science Foundation has pursued deliberate strategies in regard to the improvement of science and mathematics curriculums. Immediately following the organization of the Foundation, an investigation was launched into the nature and status of science education in the United States to identify the most serious deficiencies and the areas in which the Foundation has or could develop the capability to help.

Two principal deficiencies were uncovered. A large fraction of the persons who taught scientific subjects were inadequately prepared in the subject matter they taught. Second, investigation disclosed gross inadequacies in the instructional materials available to teachers.

The Foundation concluded that it was important to encourage the reappraisal of instructional materials at all academic levels by first-rate scholars and secure and support their active participation in developing much improved materials. The aim was to develop materials that would be scientifically accurate and thoroughly sound conceptually and pedagogically. The Foundation further concluded that:

- Pedagogical considerations required the closest cooperation and involvement of excellent teachers experienced at the academic levels of the proposed materials.
- The materials should be throughly tested before being made generally available.
- Encouragement and, if necessary, support should be given to the development of several different approaches to avoid inflexibility and undue uniformity in the course of instruction over the Nation.
- Encouragement should be given to the development of improved materials along both traditional and novel lines.

Recognizing that education is a cumulative process, the Foundation early determined that efforts to improve instructional materials should be launched at all levels. But they also decided that it was impractical to try to do everything at once; from the outset, carefully considered priorities were established.

High school was chosen as the first level at which to begin. It was the earliest level at which the several sciences are taught as discrete and separate subjects, at which the interest of competent scientists could be initially obtained, and in which the most immediate effects on easing the student's transition to college could be secured.

More recently the Foundation has supported studies at the college level. The effects of the extensive work on secondary curriculum have been quite apparent in entering college students, and institutions of higher education have discovered that they must now begin their instruction at more sophisticated levels than formerly.

The Foundation has found elementary course content the most difficult and at the same time, in some ways, the most in need of improvement. At the elementary level,science is seldom treated as a course of study by itself; yet it is the level at which understanding of science should begin, and it is the level where the greatest number of students and teachers and the widest disparity of interests and capabilities of both are found.

The Foundation has supported a very wide variety of projects under its Course Content Improvement Program. While almost no two are alike, they may be categorized into the following types:

> Conferences on Course Content or Curricula, typically low-cost, one-time-only projects in which a group of scientists and educators meet for a discussion in depth of some aspect of curriculum or course development
>
> Small-Scale Experimental Projects, typically research aimed at discovering a new way to teach an idea, that way having much broader applicability than the project itself. Production of materials is of secondary concern here.
>
> Large-scale Materials Development Projects, to marshal the knowledge of a large number of experts of various types for an extended period of time in order to develop, try out, and eventually make generally available a battery of instructional materials for actual classroom use.
>
> Commission-type Projects, typically the support of a committee or commission of individuals whose purpose is to stimulate scientists in their fields of interests to constructive action in improving courses and curricula.
>
> Instructional Equipment Development Projects, typically giving modest support to individuals who undertake the development of a device for demonstrating or teaching some particular scientific phenomenon.

In administering the Course Content Improvement Program, foundation officials have pursued a basic set of policies. First, they have sought to take care that the results of the overall course content efforts (including those not undertaken with Foundation support) add up to meaningful patterns and sequences that are usable by educational institutions in a systematic way. This consideration has stimulated both a diversity of approaches and careful attention to the relationship of proposed materials to others completed or still under development.

The importance and difficulty of course improvement, in the eyes of The Foundation, require the personal participation of distinguished experts and first-quality scientific leadership in the projects the Foundation supports.

Priority is given to projects designed to develop materials generally usable in many schools. Special attention is accorded to fields in which current materials seem to be inadequate and also to newly emerging areas, especially those of an inter-disciplinary nature. The Foundation is concerned that initiative for a project must arise in the scientific community; there must be evidence of a real commitment on the part of scientists.

As a matter of policy, study groups are given the fullest freedom to develop their materials according to their professional judgment. There is no implication of governmental responsibility for, nor endorsement of, the content or organization of the materials.

Materials produced must make their way on their merits. Foundation funds may be used for the dissemination of information about the work of projects but not for promoting the adoption or utilization of project products. To guard against the development of a permanent cadre of textbook writers who might eventually lose touch with advances in their fields and the possibility of any one group developing an undue influence or a new orthodoxy, the Foundation will not support any one curriculum improvement group indefinitely.

Finally, inasmuch as the objective is to obtain the development of excellent models, even though the models themselves may be adopted for use, the Foundation will not undertake the support of repeated revisions of given materials.

The education-related research and development responsibilities of the Office of Computing Activities (OCA) are managed by announcing areas of support and engaging equally in the receipt of unsolicited proposals and the stimulation of activities in selected areas in the field. In this regard OCA operates in a less passive mode than the typical Foundation program. OCA supports R&D work on computer-based instruction, curriculum development in the computer-based instruction, curriculum development in the computer sciences, and block grants for the development of departments of computer science. In FY 1969, of the total NSF budget, $17.0 million was allocated for research and development activities.

Office of Economic Opportunity

The management strategies employed by the Office of Economic Opportunity in administering their education-related research and development activities are program-related and evaluative in character. Research, development, and evaluation are squarely directed to the overall mission of the agency and more particularly to the identified education program elements which comprise the larger War on Poverty. Thus, research and development for OEO is built into the operating programs, although there is a strong and meaningful provision for centralized approval of R&D efforts.

The place of evaluation in OEO's education-related R&D is central. Rather than conceiving of evaluation as retrospective examination of how and whether operations are meeting program goals, however, OEO deliberately sets up experimental situations to determine through evaluation the more effective structures for accomplishing program objectives.

The relation of OEO program evaluation findings to the formulation of research and development priorities in education and training is unique and important. The agency is in the process of reorienting its research and development activities. The aim is to establish a strategic research program, cutting across program categories of education, manpower, community action. The reorientation will enable OEO to build, test and replicate improved models intended (1) to strengthen existing programs where evaluations and demographic research indicate program weakness, or (2) to formulate and test entirely new program treatments to serve as models for new programs where evaluation findings and demographic data indicate that new approaches are desirable. This model building and testing approach will give OEO a much more rigorous instrument through which to fulfill its innovation role in areas that involve education and training. The rigorous testing of models represents a distinct advance over the reliance on "demonstration" efforts that characterized the prototypes of such OEO programs as remedial, tutorial, and adult education, neighborhood health centers, and advocacy legal services programs. Model building and testing will also provide OEO with yardstick information about program potentials against which to assess the success of operating manpower training and education programs delegated to the Department of Labor and the Department of Health, Education, and Welfare.

Other Federal Agencies

The research and development strategies of all other Federal agencies are sufficiently similar in its broad outline to warrant treating them together.

This similarity is related to the fact that the involvement of agencies such as NIMH, NICHD, Department of Defense, NSF (for other than its computer and course content responsibilities), and other Federal agencies with smaller involvement in educational R&D activities may be best described as ex post facto. USOE, OEO, and NSF (in the activities described above) have adopted conscious and deliberate missions and objectives to which they have oriented their R&D programs.

The other agencies support education-related research, but not as a consequence of a deliberate policy to accomplish identifiable objectives for instruction or the educational system. Rather, the objective for these other agencies is more typically phrased in terms of the support of science in relation to an agency's mission. The identification of education-related work is an after-the-fact designation, not the consequence of policy deliberately pursued by the agency in question. However, it should be added that it is clear that the pursuit of basic knowledge is necessary to the ultimate achievement of scientific breakthroughs and knowledge that may increase the relevance and effectiveness of educational programs as well as those of other human endeavors. Such information, achieved through support of free inquiry into broad areas of an agency's mission, is necessary to undergird goal-oriented programs such as education.

The examples of NICHD and NIMH management are prototypical of the other agencies. NICHD, for example, has a FY 1969 budget in the neighborhood of $71 million to accomplish its mission of helping individuals achieve a normal healthy life from conception to death. Except for a relatively small amount needed to cover administrative costs and to support a few in-house research projects, the funds are used to support research and training projects in the biological, medical, behavioral, and social sciences to foster efforts to acquire new knowledge and deeper insight into the health problems and requirements of mothers and children, and fundamental understandings of the processes of human life and the development of all individuals throughout their life span.

Support for educational research and development is not one of the Institute's five categorical fields of interest (see Chapter IV); it is a by-product of support for its mission.

A second reason why it is misleading to suggest that NICHD has a program for the support of educational R&D, in the sense that the term "program" is normally used, is that in keeping with the research support policies of the National Institutes of Health, support is given over a very wide range of possible projects, with the chief criteria being scientific excellence and relevance to the Institute's extremely broad mission.

A third reason is that most project proposals are unsolicited and are made at the initiative of members of the scientific community. Of the total NICHD research budget, funded unsolicited projects account for 86 percent of the total. The remaining 14 percent of the budget includes "directed" or staff-generated research funded by contracts and in-house (intramural) research. The method used by NICHD (and the other Institutes, including NIMH) in selecting those project proposals which it will support involves three steps:

- There is an initial review by a relevant committee composed of scientists to determine (a) the scientific merit of the proposal, (b) the investigator's competence in the proposed research area, (c) the adequacy of available research facilities, (d) the relationship of the budgetary estimates to the proposed research, and (e) the overall significance of the project relative to research needs.

- There is then a final review of the recommendations of the study committee by the National Advisory Child Health and Human Development Council (NACHD) to determine its relevance to the Institute's policies, program needs, availability of funds, and scientific merit. No research grants are made without the approval of the Council. NACHD is composed of outside scientists and several lay people. The Council meets three times a year.

- The review committee will have rated their project proposals on a rating scale that is uniform for all committees, according to desirability. These ratings--perhaps from a dozen or more committees acting independently--are then put through a mechanical process in the NIH Division of Research Grants, by which the approved project proposals are ranked according to the review committee ratings, and a "Pay Line" is established when the cost of the higher ranked project proposals exhaust the availabe funds.

This procedure is common to all Institutes in the NIH complex. It is relevant to note that the system makes it more difficult for NICHD to focus on a few selected problem areas within its broad domain. However, the NICHD Council's review includes a determination of a project's relevance to NICHD program needs and priority areas, as established by the Council.

The above paragraphs are descriptive of NICHD R&D management strategies and procedures at present. There are indications that a move away from them--at least slightly away--is being made. Specifically, arrangements have been made for the establishment of several University-based Research Centers.

One group of twelve such centers will deal with achieving fundamental understandings of the causes, prevention, and amelioration of mental retardation and related aspects of human development. All twelve centers are at least partly operational and eight are or will be fully operational in FY 1969. By FY 1970, eleven will be fully operational, with the twelve in full operation by FY 1971.

These centers conduct basic, applied, and clinical research in problems of learning, experimental education, remedical techniques, methodology, and other investigations relevant to the educational process of handicapped and normal youngsters. The broad research programs of these centers vary, with some centers having a primary focus on biomedical aspects, others with a primary focus on behavioral aspects, and the majority concerned with both biomedical and behavioral research. Since three-fourths of the mentally retarded are in the disadvantaged segment of our society, four centers have extensive projects concerned with the prevention and amelioration of poverty-linked retardation in disadvantaged populations.

The procedures adopted by NIMH are similar to those of NICHD. In the same manner, they result in the support of educational R&D activities as a by-product of the broad mission identified for NIMH. In like fashion the behavioral and social science research which NSF supports over and above their course content and computer responsibilities is a resultant of the unsolicited proposals which the Foundation receives and the panel review procedures which the NSF uses to select its grant awards.

Private Foundations

Interviews with education program officers of foundations awarding support for educational R&D revealed that, in management of their total resources (e.g., the decision-making process as to what areas of activity to support, the monitoring of projects in progress, and the degree of attention to where the foundations see themselves in relation to the improvement of education through research and development), the foundations as a group are relatively homogeneous. The management of the foundations conforms to the following patterns.

The foundation decides on a broad area of concentration, or, as is the case with the larger foundations, several broad areas. The decision-making body is the highest governing body of the foundation, usually the Board of Directors. In the larger foundations considerable professional staff work goes into preparation of background material relating to alternatives for the Board's consideration. This material is, of course, distilled by the top-level staff of the foundation, and is usually presented to the Board by the President in several stages, a process designed to narrow successively the range of alternatives until a satisfactory set of foundation objectives emerges. The staff work and the President's recommendations carry a great deal of weight, of course, but at this level of decision the Board usually takes a very active part, with Board members making their own proposals to the President and the staff, and debating the merits of alternatives in a process which might last for many months. What emerges is, in effect, a self-created charter, or mandate, which can be amended only by the Board, and which lays out clearly, and limits, the purposes for which the foundation funds can be used.

In the smaller foundations the procedure is likely to be less elaborate, but there is essentially the same outcome: a self-created and self-limiting charter which carries the authority of the highest governing body, and which can be amended only by that body.

In all foundations there may be a higher limiting factor in the terms of the bequest, or other funding, through which the foundation was established. For example, Carnegie Corporation's activities are restricted (with a small exception) to those which further education; the Russell Sage Foundation can operate only within the United States.

The second level of decision-making is to determine which specific activities to support within the areas of interest as determined by the Board. Here the professional staff plays a more decisive role. Whereas in the determination of the "charter" the role of the staff is largely advisory to the Board, at this second level a great deal of the actual (if not the procedural) decision-making is in the hands of the staff. In the larger foundations it is very seldom that the staff recommendations with respect to projects are not ratified by the Board, although the Board usually reserves the formal power of veto. The dominance of the staff at this level is due to three factors:

- The sheer volume of projects which come up for consideration is such that, as a practical matter the Board cannot possibly review them in detail in any responsible way.
- The professional competence of the staff is such that projects proposed for approval have already been carefully screened for relevance to the foundation's purposes, for technical feasibility, and for competency of the grantee.
- The staff -- or at least the officer who presents the proposals -- knows his Board, and will not recommend projects which he knows would not be acceptable.

Almost without exception, foundation support is in the form of grants. Typically, there is very little monitoring, it being assumed that the grantee will do his work in a responsible way. Occasionally, however, the project officer of the foundation will take an active and participatory part in the project; this mostly happens only in the smaller foundations. There are signs that the major foundations may begin to take a more active role in project monitoring, particularly in larger demonstration or action programs.

With respect to research projects, the major foundations are seldom interested in carrying them through to the development or dissemination stage. A notable exception is the Carnegie Corporation, which often finances the preparation and publication of books based on the results of projects which it has supported. Another exception is the Kettering Foundation, which has an active interest in classroom implementation of the validated findings which emerge from its funded projects.

For the sake of clarity on this point, it is important to distinguish between research projects (to which the above generalization applies) and demonstration or operational projects. Foundations are likely to carry the latter to their logical conclusion (or abandonment if they are proven to be impractical).

Investigation has disclosed no case (with the possible exception of Kettering) in which a foundation includes educational R&D as such among its stated areas of interest. However, substantial support for educational R&D is given by the larger foundations under broader classifications --e.g., Towards Equality (Rockefeller), Aid to Education (Ford), etc. Smaller foundations also support educational R&D in connection with a single, but broader, foundation purpose--e.g., Mental Health (Hogg), general aid to schools in Flint, Michigan (Mott).

The point here is that foundations do not have a method of managing their educational R&D resources that differs in any respect from their management of all resources. As a rule (to which we have found no exceptions) they do not even classify their projects so as to show educational R&D separately.

Within a larger field of interest, say aid to education, projects with an R&D content will take their place alongside demonstration, operational, (general) support, scholarships, and other projects in the general area of education, all of which will be judged on their merits. There are no earmarked educational R&D resources which are managed in a way that differs from the management of all resources.

Private Industry

The management strategies currently being pursued by private industry in educational research and development display considerable variation depending upon the corporation and the kind of industry of which it is a part. Conceptions of research range all the way from market research through textbook writing to field testing and the more elaborate models of the test developers and the aerospace industry.

Publishing corporations by and large agree that what constitutes research and development in the production of textbooks is not the same kind of research and development found in the defense and aerospace industries. Many companies interviewed as part of a larger study of R&D in the education products industries[9] felt that much of the work associated with text development was mainly editorial work and manufacturing. At the college level this was particularly true, and publishers did not feel that research, testing, and validation of materials were relevant.

At the elementary and secondary level of text publication, however, different practices were employed depending on the subject matter or other characteristics of the materials. In addition, there was little consensus about what was involved in research and development in this area. Some saw it simply as keeping abreast of research and incorporating relevant findings into new materials. Many, however, exhibited some concern about field testing. Some publishers made distinctions on the basis of the subject matter of the textbook on the grounds that teaching and learning in some subject areas is more easily tested.

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[9] This study is being conducted by the Institute for Educational Development in New York City.

The most sophisticated models of research and development in publishing were found among the test publishers.

Among the non-book publishers it was found that many identified research and development in terms of the defense-aerospace model. They were equally candid about admitting, however, that in those terms little such work was undertaken by the non-book publishers. Most of the work they undertook was market research attempting to assess the demand for potential products which they would invent and then make available. Exceptions to this role were noted, but the description above generally holds.

The large corporations in the electronics and communications media possess elaborate models of research and development but very few were found to approximate them with the activities they had underway at the time of the study. Only a handful of the giants appeared to have educational materials divisions whose activities might come close in the near future to matching the extended basic-research/applied-research/development model they described. Within these giants, however, wide variation was found between parent organizations and subsidiaries, further confirming the conclusion that, for industry as a whole, the picture is complex and varied.

Summary

This chapter has described a considerable variety of management strategies. Some have ranged over a number of areas of concern including definition of mission, instrumentalities, and objectives. Others, having been focused on a particular concern, for example, NSF's Course Content Improvement Program, have been able to pursue and sustain a consistent and clearly understood model of R&D management. Some programs operate on a largely unsolicited basis; in some cases education program areas may be identified; in others the support of basic science in a broadly defined area is the fundamental mission. The variation is as much a function of the different character and responsibilities of the sponsors as it is imprecise definition of research and development for education.

Varied management strategies do not necessarily mean the absence of overall design and conception. The variation could be a function of a concerted effort to develop a multi-faceted approach to the improvement of education through research and development. Nonetheless, the absence of references by any of the agencies to their role in relation to the existence of a concerted program strategy across the entire field must be taken as evidence that the variation is accidental rather than deliberate. In short, the support of educational research and development in the United States is not presently characterized by an overall coordination or design.

Chapter VII

Financial and Manpower Resources for Educational Research and Development

Effective management of the research and development enterprise for education requires fairly accurate knowledge of the financial and manpower resources available for such activities. The need for solid information about trained personnel is, of course, central to any understanding of the capability to carry out the program. Knowledge about the financial resources available provides an alternative way of estimating current manpower, an index of relative priority, and a way of indicating the present scope of the educational research and development enterprise.

Financial Resources

Financial resources known to have been available for educational research and development from all sources in Fiscal Year 1968 approximated $193.3 million. On the basis of appropriation figures for USOE, NSF, OEO, and NIH it can be estimated that the figure is substantially the same in the current fiscal year (FY 1969).

This amount stands in relation to a total expenditure on education in the Nation, for the same time period, of $54.6 billion.[1] Thus, the expenditure for educational research and development in FY 1968 constitutes 31/100 of 1 percent of the total educational expenditure. (If capital outlays are excluded from consideration the percentage rises to 36/100 of 1 percent.)

The programs for which the exact allocation for educational R&D activities is known include (1) the Office of Education, (2) the Course Content Improvement Program of the National Science Foundation, and (3) the Office of Economic Opportunity. The amounts of money reported by these agencies constitute the bulk of the documented resources which were spent in FY 1968.

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[1] Digest of Educational Statistics 1968, U.S. Government Printing Office, Washington, D.C., 1968, p. 17.

United States Office of Education

The financial resources available from USOE constitute the larger portion of the Federal commitment to educational research and development. This position of pre-eminence has been arrived at only recently. Table 1 illustrates the growth of educational research appropriations administered by USOE since FY 1957. It reveals a very rapid growth over the fourteen-year period, with the sharpest increase occurring between FY 1964 and FY 1966. Since that time, available support has leveled off.

The small growth rate shown for the period between FY 1966 and FY 1969 for the total program (See Figure 1) is somewhat misleading. The appropriation in FY 1966 included an amount of $20 million for construction and equipment purchases, the FY 1967 budget an amount of $12.4 million for the same purposes; no additional appropriations for these purposes have been requested, however, since that date. The growth curve for program operations, therefore, is not as flat as the total figures for the agency would otherwise indicate.

More detailed breakouts of program categories under the authorization of the Cooperative Research Act are provided in Table 2. The relative levels of support for centers, laboratories, project R&D, ERIC dissemination, and research training can be seen in this array. (Allocations to individual centers, laboratories, and ERIC components can be found in Chapter V.)

National Science Foundation - Course Content Improvement Program

The appropriations history of the Course Content Improvement Program of NSF is presented in Table 3. The program began slowly, emphasizing conferences and meetings for the first three years. (The exception was the funding of the Physical Sciences Study Committee, which received its first operational grant in the third year of the program). In 1959 support jumped to more than $6 million. Beginning in 1962 increases of some size occurred in each of the seven years. In 1969 the program experienced a reduction in support.

Office of Economic Opportunity

Data secured from the Office of Economic Opportunity indicate the funding history depicted in Table 4.

The Full Picture: FY 1968

In addition to the funding history of the three Federal agencies most directly involved in educational research and development, it has been possible to document resources made available by all sponsoring agencies. The figure was arrived at by querying two large information systems, Science Information Exchange (SIE) and the Defense Documentation Center (DDC) which keep detailed records of science and research activities, supplemented with data about known activities not included in those data banks. The procedures undertaken

Table 1

Appropriations for "Research and Training," U.S. Office of Education, 1957 - 1970 (In thousands of dollars)

Fiscal Year	Coop. Research	NDEA Title VI	NDEA Title VII	Voc. Research	Library Research	Handicapped Research	TOTALS
1970*	88,900	2,500	c	1,100	e	18,000	110,500
1969	76,077	a	b	11,375	d	15,000	102,452
1968	66,467	3,000	4,400	13,550	3,550	11,000	101,967
1967	70,000	3,100	4,400	10,000	3,550	8,100	99,150
1966	70,000	2,800	4,000	17,750	-	6,000	100,550
1965	15,800	2,250	4,963	11,850	-	2,000	36,863
1964	11,500	1,800	5,000	-	-	1,000	19,300
1963	6,985	1,800	5,000	-	-	-	13,785
1962	5,000	2,000	4,755	-	-	-	11,755
1961	3,357	2,000	4,700	-	-	-	10,057
1960	3,200	4,000	3,000	-	-	-	10,200
1959	2,700	2,500	1,600	-	-	-	6,800
1958	2,300	-	-	-	-	-	2,300
1957	1,000	-	-	-	-	-	1,000

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* - requested.
a - appropriation included in Cooperative Research in the amount of $2,465,000.
b - appropriation included in Cooperative Research in the amount of $4,200,000.
c - legislation authorization discontinued.
d - appropriation included in Cooperative Research in the amount of $3,000,000.
e - appropriation included in Cooperative Research in the amount of $2,200,000.

Figure 1

Appropriations for "Research and Training"
U.S. Office of Education, 1957-1969

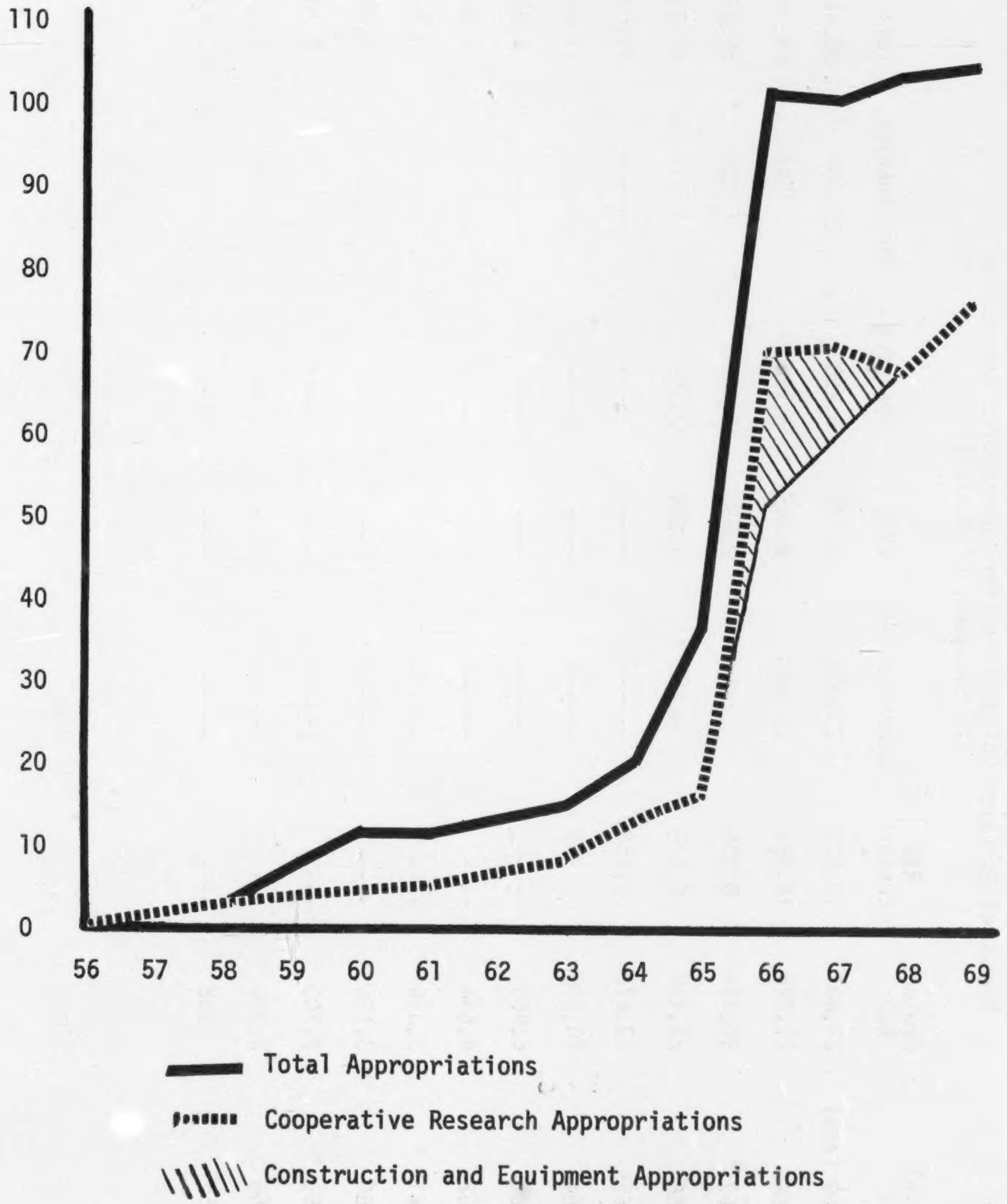

Table 2

Bureau of Research Obligations (for Cooperative Research only)
(In thousands of dollars)

Fiscal Year	Project R&D	R&D Centers	Laboratories	ERIC	Training	Construction	Total
1969 (est)	23,667	10,800	23,600	4,226	6,750	29,581	98,624
1968	20,723	10,893	22,926	2,845	6,164	593	64,144
1967	20,514	8,030	17,669	2,693	6,481	329	58,676
1966	26,429	6,579	8,658	1,064	7,189	1,311	51,230
1965	13,672	2,168	------	----	-----	------	15,840
1964	10,500	998	------	----	-----	------	11,498
1963	6,985	-----	------	----	-----	------	6,985
1962	4,644	----	------	----	-----	------	4,644
1961	3,356	----	------	----	-----	------	3,356
1960	3,196	----	------	----	-----	------	3,196
1959	2,700	----	------	-----	-----	------	2,700
1958	2,300	----	-----	-----	-----	------	2,300
1957	998	----	-----	-----	-----	------	998

Table 3

Course Content Improvement Program Obligations for Fiscal Years 1955-1969

Fiscal Year	Net Obligations (thousands)
1955	$ 9
1956	17
1957	630
1958	835
1959	6,030
1960	6,299
1961	6,411
1962	8,990
1963	12,632
1964	13,976
1965	14,552
1966	15,564
1967	18,355
1968	19,352
1969	13,100 (estimate)

Source: NSF Justification of Estimate of Appropriations - The Congress, Fiscal Years 1957 through 1970

Table 4

OEO Educational R&D Expenditures

(millions)

	FY 67	FY 68	FY 69
Head Start			
Research & Demonstration	$4.1	$3.6	$4.1
Evaluation	1.7	2.3	1.9
Total	5.8	5.9	6.0
Follow Through			
Research & Demonstration	-	1.2	2.5
Evaluation	-	1.0	1.8
Total	-	2.2	4.3
Community Action Program (Education)			
Research & Demonstration	5.2	4.7	4.0
Grand Total	$11.0	$12.8	$14.3

for generating this data are described fully in Chapter VIII.

The SIE and DDC material. supplemented by data from OEO and NSF, enabled us to develop Table 5 which represents the documented minimum financial support for educational research and development in the United States in FY 1968. The amounts in Table 5 constitute the absolute base level of funding. The amount can almost certainly be expanded somewhat. What we do not know is in what degree and from what sources of sponsorship.

There is good reason to believe that at least four types of sponsors of educational R&D are under reported in Table 5. Private foundations in all probability support more projects than are reported to Science Information Exchange (which yielded abstracts of projects supported by foundations totaling $7.344 million). The absence of abstracts from the Department of Defense in sufficient numbers to match general impressions of the scale of activity in selected fields (notably automated instruction and the use of information technology) also leads to the suspicion that the amount attributed to DOD can be estimated upward.

A third upward projection may also be warranted for sponsorship by State and local agencies. Provisions for evaluation in the Elementary and Secondary Education Act of 1965 have undoubtedly added resources which were not available previously, and some of the activities supported under Title I and III of the Act can fairly be listed under the development category (even if rigorously defined).

A fourth type of sponsor for which very little information is available is private industry. Only a very few activities from this group were reported to SIE.

A final circumstance entitles us to elevate the estimated resources directed to educational R&D: 455 of the 1724 abstracts from SIE, DDC, and NSF reported an unknown funding level. The project descriptions themselves indicate that they are smaller than average in size (few of the abstracts for which funding levels were unknown, for example, were development efforts or large scale surveys). Still, if the actual funding levels were to be determined, they could be expected to add a considerable sum to the FY 1968 totals.

In sum, the amounts in Table 5 document the absolute minimum amount expended on educational research and development activities in the United States in FY 1968. A conservative additional estimate based on the five conditions stipulated above would up the documented base total about 25 percent. We judge, accordingly, that approximately $250 million was spent on educational research and development activities in the United States in FY 1968.

Table 5

Documented Minimum Base Financial Support for Educational Research and Development by Sponsoring Agency

	FY 1968
United States Office of Education	$101,967,000
National Science Foundation	23,326,000
National Institute of Mental Health	11,860,000
National Institute of Child Health and Human Development	8,377,000
Office of Economic Opportunity	12,800,000
Department of Defense	6,046,000
Other Federal Agencies (Labor; Commerce; Children's Bureau; Agriculture; Social Rehabilitation Service; Food and Drug Administration; Interior; and Endowments for Arts and Humanities)	6,725,000
Private Foundations	7,344,000
All Other (State agencies; higher education institutions; professional and academic associations; etc.)	13,845,000*
TOTAL	$192,290,000

*The SIE-and DDC-collected material produced a figure somewhat lower than this. To it have been added amounts equal to available NSF figures representing the FY 1965 obligations of State agencies and FY 1967 local government agency obligations for educational R&D, which otherwise would have gone unaccounted.

Manpower Resources

Estimates of trained manpower available to perform educational research and development are extremely hard to come by. Definition of role is crucial. Defining the topics and concerns that might be covered by the term "educational research" is equally important. Actually locating and counting such people is difficult even when these two parameters are defined.

A Beginning Estimate of the Manpower Supply for Educational Research

The analysis developed in this section is drawn from Chapter 2 of the study recently completed by David L. Clark and John E. Hopkins, A Report on Educational Research, Development, and Diffusion Manpower, 1964-1974.[2]

As part of their report Clark and Hopkins present the most detailed manpower analysis of the educational research community that exists. The analysis is based on 1964 data and is consequently somewhat out-of-date. The Federal funds for educational research and development have increased by a factor of at least five, an increase which has surely had some impact on the size of the manpower pool today. Since their analysis is the best that exists, we have made use of it, keeping in mind that it is necessarily a minimum picture at this point in time. The data reported by Clark and Hopkins draw heavily upon three empirical studies of researchers in education: by Sam Sieber, by Robert Barger and associates, and by Guy Buswell and associates.[3]

At the beginning of the decade of the 1960's two prominent educational researchers attempted to typify the world in which they were living. Griffiths in 1959[4] and Fattu in 1960[5] found that the number of personnel involved in educational research was small and that the work produced seemed not only to have little impact on the behavior of professionals in the field but also to be adding little to education's knowledge base.

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[2] Bloomington, Indiana: Indiana Univ. Research Foundation, 1969.

[3] Sam D. Sieber, The Organization of Educational Research, Cooperative Research Project No. 1974, New York: Bureau of Applied Social Research, Columbia Univ., 1966, 364 pp.; Robert Bargar, Egon Guba and Corahann Okorodudu, Development of a National Register of Educational Researchers, Cooperative Research Project No. E-014, Columbus, Ohio: The Ohio State University Research Foundation, 1965, 139 pp.; Guy T. Buswell, T.R. McConnell, Ann M. Heiss, and Dorothy M. Knoell, Training for Educational Research, Cooperative Research Project No. 51074, Berkeley, California: Center for The Study of Higher Education, Univ. of California, 1966, 150 pp.

[4] Daniel E. Griffiths, Research in Educational Administration: An Appraisal and a Plan, New York: Bureau of Publications, Teachers College, Columbia University, 1959, 59 pp.

[5] Nicholas A. Fattu, "The Role of Research in Education--Present and Future" Review of Educational Research, Vol. 30, No. 5, December, 1960, pp. 409-421.

The Buswell and Sieber investigations of the early 1960's substantially validated the essentially impressionistic reports of Griffiths and Fattu. Buswell found the field of educational research composed mainly of fragmentary, small-scale investigations; also, nearly one-third of a sample of 818 education doctorates received in 1954 had had no research publications. One hundred respondents pointed to a single research publication and another hundred could list two or more.

The Griffiths, Fattu, Buswell, Sieber, and Bargar studies together indicated that:

- Research in education had not been institutionalized. It was an individualistic pursuit.
- The investigations were fragmentary and small-scale efforts.
- The educational researcher was a part-time functionary.
- Most educationists were not involved directly in the research field and their productivity as researchers was miniscule.
- Change was slow to come to the field. Despite increases in Federal funds little difference could be observed from 1954 to 1964.
- Research was not central to the operation of most schools of education and, inferentially, to the operation of elementary and secondary schools.
- The input of new researchers to the field of education was small, probably not more than one of ten doctoral graduates.
- The field was inhabited chiefly by researchers with a background in psychology or educational psychology.
- Most of the research effort was university-based.
- The research effort was centered for the most part in 10 to 20 universities offering the doctorate in education.[6]

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[6] Clark and Hopkins, op. cit., pp. 45-46.

In developing their analysis, Hopkins and Clark discovered that no single body of empirical data available to, or collected by, the survey staff yielded a clear picture of the number of persons who might be classified as research, development, and diffusion (R, D, and D) personnel in education in 1964. Consequently, they engaged in comparison, examination, and re-analysis of the extant data in an effort to define and refine the number of persons within each personnel group. Clark and Hopkins first examined the Buswell and National Register studies (Bargar) to establish the absolute base for the number of R, D, and D personnel in education in 1964. In other words, their initial assumption was that the problem lay not in justifying the inclusion of an individual case identified, for example, by Buswell, but rather in determining the number of cases not picked up in the Buswell or National Register studies.

Clark and Hopkins' careful analysis of the Buswell, Bargar and Sieber data is summarized in Table 6.[7] On the basis of these data Clark and Hopkins characterized the educational R, D, and D community in the United States in 1964 in the following way:

- The preponderance of R, D, and D personnel in 1964 was located in college and university settings, functioning as individual researchers on a part-time basis.
- Most individual researchers reported devoting part-time to R, D, and D activity, and the modal time reported was very much part time--one-fifth to one-third time.
- Research personnel located in schools of education were most likely to be spending a small percentage of time on their research activity.
- Within the college and university setting 50 percent to 60 percent of the R, D, and D personnel were affiliated organizationally with a school or college of education.
- USOE research personnel in 1964 were either working as social bookkeepers or as specialists conducting discrete studies in substantive areas.
- State Department of Education personnel were chiefly normative researchers employed in research divisions.
- Schools and school systems were represented by some teachers, counselors, and administrators working for a small percentage of their time on R, D, and D projects and by data gatherers functioning in a research division.

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[7] Ibid., p. 76

- Few development and diffusion personnel seemed to be functioning in the R, D, and D community in 1964, and even fewer were identified through the questionnaire and search techniques employed in the study.[8]

Beginning from the base estimate established in Table 6, Clark and Hopkins then extended their analysis to establish an overall estimate of R, D, and D personnel in education. Clark and Hopkins in effect rebuilt Table 6 to reflect not just the actual number of respondents to the Barger study but an estimate of the total field based on all available data for July 1, 1964. Basing their re-analysis on the Sieber study, the Buswell study, personnel reports of the U.S. Office of Education, the Bean study of State education agencies, the NEA Research Division study on Research Units in Local School Systems, the annual reports of AIR and ETS, and other publications, Clark and Hopkins produce a final estimate of 4,125 R, D, and D personnel in education. This estimate is detailed in Table 7.[9]

Additional Estimates of Related Manpower

Some additional perspective can be lent to the picture of available manpower by examining data which exists on graduate students and trained professionals in academic disciplines relevant to educational research and development. Two sources have been employed: the report of the National Register of Scientific and Technical Personnel; and the reports of the National Center for Educational Statistics (USOE) on earned degrees conferred in higher education.

The National Register data is based on questionnaires returned by almost a quarter million scientists in 1966, three-fifths of whom were in the physical sciences, one-fourth in the life sciences, and the remainder in the social sciences. These 243,000 respondents constitute 67 percent of the number to whom questionnaires were sent, from a list developed in cooperation with participating academic societies.

Respondents were asked to indicate their field of greatest scientific competence, taking into consideration their training and work experience. The figures reveal that 8 percent of the respondents identified their scientific field as psychology, 5 percent as economics, 1 percent as sociology, and 1 percent as linguistics and anthropology. This response is for all degree levels.[10]

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[8] *Ibid.*, pp. 74-75.

[9] *Ibid.*, pp. 105-106.

[10] *American Science Manpower 1966: A Report of the National Register of Scientific and Technical Personnel (NSF 68-7)*, U.S. Government Printing Office, Washington, D.C., 1967, p. 15.

TABLE 6. SAMPLE OF R, D, AND D PERSONNEL BY AGENCY SETTING AND FUNCTIONAL JOB EMPHASIS--1964*

Setting	R, D, D Program Dirs. and Staff						Individual R, D, D Personnel					
	Outside-funded	Res. and service bureaus	Institutional research	Sub-total	R, D, D project directors and staff	R, D, D training program directors and staff	Hard-core prod.	Reg. prod.	Occa. prod.	Sub-total	Stimulators and coordinators of R, D, and D activities	Total
COLLEGES AND UNIVERSITIES												
Schools and Colleges of Education	7	124	3	134	39	--	42	187	440	669	15	857
Schools and Depts. of Psychology	1	48	1	50	14	1	19	107	168	294	--	359
Other Behavioral and Social Science Depts.	1	45	-	46	11	--	32	76	100	208	1	266
Other Discipline and Academic Areas.	-	14	-	14	7	1	13	37	62	112	10	144
College and University Administration Units	-	2	62	64	1	--	--	5	35	40	5	110
Sub-total	9	233	66	308	72	2	106	412	805	1323	31	1736
FEDERAL AGENCIES												
U. S. Office of Education	-	18	2	20	--	--	21	31	16	68	9	97
Military Agencies	-	14	7	21	2	--	4	1	1	6	3	32
Other Federal Agencies	-	16	3	19	1	--	9	5	12	26	4	50
Sub-total	0	48	12	60	3	0	34	37	29	100	16	179
STATE AGENCIES												
State Departments of Education	-	36	11	47	3	--	2	5	13	20	4	74
Other State Agencies	-	8	-	8	12	--	1	5	22	28	2	50
Sub-total	0	44	11	55	15	0	3	10	35	48	6	124
SCHOOLS AND SCHOOL SYSTEMS												
Local Public School Systems	-	1	117	118	10	--	1	7	47	55	3	186
Other Schools and School Systems	-	2	26	28	--	--	--	--	6	6	--	34
Sub-total	0	3	143	146	10	0	1	7	53	61	3	220
PRIVATE RESEARCH INSTITUTES AND AGENCIES												
Private Research Institutes	-	87	-	87	2	--	2	2	1	5	2	96
Private Social Service and Welfare Agencies	-	9	-	9	1	--	4	6	7	17	1	28
Sub-total	0	96	0	96	3	0	6	8	8	22	3	124
PROFESSIONAL ASSOCIATIONS												
Professional Education Associations	-	42	-	42	4	--	--	--	--	--	--	46
Related Professional, Public, Lay Assoc.	-	9	1	10	1	--	--	--	--	--	--	11
Sub-total	0	51	1	52	5	0	0	0	0	0	0	57
INTER-AGENCY ORGANIZATIONS												
Educational Laboratories	-	-	-	-	--	--	--	--	--	--	--	0
Other Inter-Agency Organizations	-	24	-	24	4	--	--	--	--	--	--	28
Sub-total	0	24	0	24	4	0	0	0	0	0	0	28
PRIVATE FOUNDATIONS	-	1	-	1	1	--	2	--	--	2	3	7
BUSINESS AND INDUSTRIAL ORGANIZATIONS	-	45	-	45	2	--	0	--	--	0	0	47
TOTAL	9	545	233	787	115	2	152	474	930	1556	62	2522

*From David L. Clark and John E. Hopkins, A Report on Educational Research, Development, and Diffusion Manpower, 1964-1974, p. 76.

Table 7

ESTIMATED NUMBER OF R, D, AND D PERSONNEL BY AGENCY SETTING AND FUNCTIONAL JOB EMPHASIS -- 1964 *

Setting	R,D, and D Program Directors and staff	Stimulators and Coordinators of R, D, and D Activities	Individual R, D, and D Personnel			Total
			Hard-Core Producers	Regular Producers	Occasional Producers	
Schools and Colleges of Education	160	40	115	265	620	1,200
Schools and Departments of Psychology	70	--	46	150	234	500
Other Behavioral and Social Science Departments	64	1	60	106	139	370
Other Discipline and Academic Areas	20	14	28	52	86	200
College and University Administration Units	150	--	--	7	48	205
U.S. Office of Education	35	20	31	46	23	155
State Departments of Education	240	10	25	25	65	365
Schools and School Systems	265	5	10	120	140	540
Private Research Institutes and Agencies	300	—	--	--	--	300
Professional Education Associations	90	--	--	--	--	90
Inter-Agency Organizations	50	--	--	--	—	50
Business & Industrial Organizations	150	--	--	--	--	150
TOTAL	1,594	90	315	771	1,355	4,125

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* From David L. Clark and John E. Hopkins, A Report on Educational Research, Development, and Diffusion Manpower, 1964-1974, pp. 105-106.

Among the doctorate holders in the sample, 12,545 (14 percent) were in psychology, 5,593 (6 percent) in economics, 2,757 (3 percent) in sociology, 830 (1 percent) in anthropology, and 750 (1 percent) in linguistics.[11]

Among the master's degree holders 6,075 (9 percent) were in psychology, 4,658 (7 percent) were in economics, 780 (1 percent) were in sociology, and a total of 401 (5 percent) were in linguistics and anthropology combined.[12]

Respondents holding only the bachelor's degree were negligible in the fields of interest here except for economics which listed 2,660 individuals.[13]

Additional information can be found in the estimates of recent degrees conferred and degree candidates in disciplines relevant to educational R&D.

Using a USOE report of earned degrees conferred in 1966-67,[14] and estimating that only 10 percent of those earning doctorates in education will be candidates for research careers, we arrive at the following approximations:

Education[15]	353
Linguistics	70
Psychology (all fields)	1,231
Anthropology	136
Economics	546
Sociology	327
Total	2,663

Similar approximations for a later year can be derived from fall, 1967, enrollment data.[16] Again using the 10 percent estimate in education, the figures below show potential researchers expected to complete doctoral requirements by June 30, 1968, in academic disciplines related to education.

Education[15]	396
Linguistics	133
Psychology (all fields)	1,450
Anthropology	216
Economics	706
Sociology	457
Total	3,358

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[11] Ibid., p. 25.

[12] Ibid., p. 28.

[13] Ibid., p. 31.

[14] Earned Degrees Conferred: 1966-67, Part A - Summary Data, U.S. Government Printing Office, Washington, D.C., 1968, pp. 12-18.

[15] The figures for education represent 10 percent of the totals on the grounds that this proportion is a fair approximation of research degrees in this field. Figures in other disciplines are totals.

[16] Students Enrolled for Advanced Degrees: Part A - Summary Data, Fall 1967.

USOE Manpower Development Activities in Educational R&D

Under the provisions of the amendments to the Cooperative Research Act contained in Title IV of the Elementary and Secondary Education Act of 1965, USOE was authorized to establish training programs for research and research-related personnel.

Six types of programs have been supported over the past four fiscal years (1966-1969). These are:

- Undergraduate training programs to recruit capable career researchers.
- Graduate training programs, awarded through graduate schools, to increase the flow of competent research personnel.
- Postdoctoral grants to help update the skills of educational researchers and to acquaint trained researchers in other fields with research in education.
- Institutes which provide short-term intensive training in particular aspects of research.
- Special projects, including seminars, workshops, personnel exchanges, inservice training programs, and other non-degree training.
- Program development grants to strengthen college and university staffs and to develop curricula for training in educational research.

The funding levels, awards, and number of trainees in each of these programs for the past four years are shown in Table 8.

In recent months Sam Sieber completed an analysis of the USOE research training programs which provides data to supplement the figures.[17]

Sieber's report covers the first year of the USOE training program, 1966-67. He found that a comparison of the geographical distribution of trainees with the distribution of USOE-funded research positions, the distribution of public school pupils, and the distribution of educational researchers at large showed that the distribution of trainees more closely conforms to that of public school enrollment than to that of educational

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Washington, D.C., U.S. Government Printing Office, 1969, pp. 9-11.

[17] Sam D. Sieber, Analysis of U.S.O.E. Training Programs, Bureau of Applied Social Research, Columbia University, January, 1968, (CRP Project No. 7-8315).

Table 8

USOE Educational Research Training Program

Program	1966 Trainees	Cost*	1967 Trainees	Cost*	1968 Trainees	Cost*	1969(est.) Trainees	Cost*
Undergraduate	134	$ 256	116	$ 108	-	$ -	-	$ -
Graduate	732	4, 385	794	4, 837	809	5, 049	809	5,200
Postdoctoral	41	621	13	265	20	397	20	400
Institute	1, 635	1, 425	1, 011	453	1,462	459	1,750	400
Special Project	-	-	-	-	-	91	-	100
Program Development	-	591	-	241	-	167	-	650
	2,592	$7,278	1,934	$5,904	2,291	$6,164	2,579	$6,750

* Thousands

researchers. More researchers are being trained in the South; there are more researchers working in the Northeast. From the viewpoint of serving the research needs of schools, Sieber found this situation to be good, since it showed that USOE programs are compensating for the disproportionate number of researchers in the Northeast.[18]

Sieber found that the great majority of graduate training programs are located in departments of education. Moreover, only about 40 percent of the graduate programs entailed interdisciplinary training. He found that the graduate training programs are more often located in institutions of higher quality and in universities that promise the strongest programs of research training. Since the better schools are more likely to have already emphasized scholarship and training for research, training programs tended to be located at such schools.

Another finding of the Sieber study was that only a small proportion of graduate programs are operated by research bureaus or centers. (It might be noted that this finding is of some cautionary significance in view of Buswell's study of research productivity of doctorates which suggested that one of the most important parts of training is work in a research organization.) Sieber also found that none of the directors of training programs was primarily affiliated with a research unit; they were predominantly located in teaching departments. Training directors were more often professional educators or researchers at large. When they mentioned a non-professional field, it tended to be professionally oriented, e.g., educational psychology.[19]

With the exception of trainees in the undergraduate program Sieber found that the majority of trainees had held a degree for several years. For the graduate programs this fact is indicative of the familiar feature of career lines in education--the interruption of studies for employment. Of the graduate students, 84 percent were employed at some time since completion of their last degree. Thus, there has been considerable discontinuity in educational career lines. Only a small minority of trainees in any program (except the post-doctoral) held research-related jobs in the recent past. The USOE training programs, however, seemed to be serving a need in helping graduate students pursue their future studies without interruption. But Sieber questioned how much commitment to research careers could be assured in view of the considerable amount of time which trainees had spent away from the university setting, particularly in teacher or administrator roles.[20]

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[18] Ibid., pp. 8, 11, and 12.

[19] Ibid., pp. 29, 34.

[20] Ibid., pp. 47-51.

The average age of the graduate trainees -- 29.1 -- makes it apparent that the OE program is making a contribution to lowering the age of the doctorate in education. Sieber estimates that the graduate trainees will be receiving their degrees about seven years earlier than the general doctorate student in education.[21]

Nonetheless, the number of graduate trainees with dependents raises the question whether they are sufficiently unencumbered by family obligations to devote their fullest attention to their studies.[22]

From other data Sieber concludes that there is little emphasis on training for research administration, a situation which he believes needs correction, and that while trainees as a whole tended to be more "field oriented" than "academic oriented," graduate trainees were divided about equally between these two types, with slightly more academically oriented researchers.[23]

A reassuring finding, however, was that three-quarters of the graduate trainees were seeking the Ph.D. rather than the Ed.D; since Ph.D. recipients are more likely to engage in research than Ed.D. recipients, Sieber viewed this trend as promising substantial payoff.[24]

Sieber directs some attention to the criticism that educational research lacks the perspective of the basic social science disciplines, as indicated by the paucity of theoretically guided research and development. He notes that most studies of research training conducted indicate that the largest category of educational research personnel is persons with backgrounds in professional education and that the level of interdisciplinary research in education is low. Although an effective means of imbuing educational research with the social science perspectives lies in recruiting more social scientists, especially in the non-psychological disciplines, the great majority of OE research training programs in departments of education, and the majority of trainees (75 percent), designated a field in professional education.[25]

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[21] Ibid., p. 77.

[22] Ibid., p. 82.

[23] Ibid., p. 85, 88.

[24] Ibid., p. 57.

[25] Ibid., p. 68.

Summary and Conclusions

In FY 1968 the United States expended $250 million on educational research and development. Using the latest figures available Clark and Hopkins estimate a 1964 manpower pool of 4,125 full-time equivalent persons. Estimating the cost per full-time professional at approximately $30,000 at that time, it is apparent that the real investment in 1964 in educational research and development was somewhere in the neighborhood of $124 million. Since Federal and private foundation sources accounted for no more than one-third or two-fifths of that amount, the remainder was obviously met by State or local sources or by donated services out of other budget categories (e.g., instructional costs for higher education).

The FY 1968 sponsored investment for educational R&D represents, after a 20 percent correction for inflation and overdue salary increases in higher education, an expansion of some 70 percent. The increasing dollar flow from sponsoring agencies, however, can in part be accounted for by noting that support for R&D which used to take the form of matching local contributions from the performing agency is increasingly being replaced by monies from the sponsoring agency.

One inescapable conclusion is that a heavy press currently exists on the trained personnel available. Some of this slack has been taken up by the entry of personnel into educational research from other academic disciplines and from industry. Some has been taken up by the addition of a growing number of recent doctoral recipients. A great portion has been taken up by on-the-job training of individuals, particularly in the fields of development, dissemination, and diffusion, who have assumed newly identified and defined roles in educational research and development. Finally, the increase in the manpower utilized is also partially explainable in terms of the increased scale of R&D work which has contributed to greater cost and a larger number of lower technical roles without necessarily creating additional demand for highly trained researchers.

The manpower supply situation does not appear likely to improve very substantially as one looks at the projected outputs of the present level of educational research training supported by USOE. While the doctoral programs will be supplying 250 to 300 new people a year and larger numbers are receiving short term training, these numbers will be insufficient to sustain any largescale expansion of the R&D effort.

Chapter VIII

A LOOK AT THE SUBSTANCE OF AMERICAN EDUCATIONAL RESEARCH AND DEVELOPMENT

No systematic analysis of the universe of educational research and development existed at the outset of this study. As part of this policy review, however, it was decided that an attempt would be made to apply a revised version of a multi-dimensional taxonomy developed by USOE's Bureau of Research to the full range of research and development activities in education sponsored by Federal, State, and private sources. The purpose of this chapter is to present the procedures employed in conducting the analysis, the results of the analysis, and illustrations of project activities representative of analytical categories employed.

Procedures

Early in the course of developing the plan of work for preparing this report, a meeting was held under the aegis of the staff of the Federal Inter-agency Committee on Education. Representatives of all Federal agencies presumed to have some role in sponsoring education or education-related research and development were invited to explore the most efficient means of gathering accurate data on their current involvement. Full discussion of the scope of the study and its design led the assembled representatives to suggest that the most productive step, given the diversity of sophistication of the several agencies in regard to their information capability, would be to direct a detailed query to Science Information Exchange (SIE).

SIE is a clearinghouse for information on current scientific research actually in progress. Government agencies and many non-government agencies with major research programs actively cooperate by furnishing the Exchange with timely information on their current programs and projects. Participating non-government agencies include private foundations and fund-raising agencies, universities, industry and individual investigators who wish to register their research. The Exchange is concerned only with records of research planned or in progress. It compiles data and technical information for program management purposes at the request of directors and administrators of the cooperating agencies.

Contact was established with the Exchange and detailed discussions held on the retrieval terms which would be most relevant to the kinds of data being sought. The tactic pursued was to employ a list of retrieval terms which would err in the direction of pulling too many abstracts rather than run the risk of overlooking projects as a consequence of attempting to retrieve a too-highly-targeted selection.

Over 4200 abstracts were retrieved, exclusive of Office of Education projects. The abstracts were delivered arranged in groups according to the sponsoring agency. The entire set was then individually reviewed in order to select out those activities which met the broad criteria for education-relatedness implied by the definitions of educational research developed in Chapter I. Each abstract was read individually and a selection made. The entire set of initially rejected abstracts was then re-examined individually once more to insure consistency of interpretation. A hundred or so abstracts which had been passed over the first time were added to the 1400 which had been originally selected.

Personal familiarity with educational research and development activities in the Federal government permitted the Director of Planning in the Bureau of Research, USOE, to make the judgment that certain agencies: notably the Office of Economic Opportunity, NSF (in its Course Content Improvement Program, and the Department of Defense, appeared to be underreported in the SIE documents. Independent initiatives were then exercised to secure the desired data from these agencies. In the case of OEO and NSF direct queries produced the desired information. In the case of the Department of Defense a procedure similar to that adopted with SIE was employed.

Department of Defense officials gave access to the Defense Documentation Center, the central information repository of research and development activities sponsored by Defense agencies. As in the case of SIE, retrieval terms were identified designed to pull an over-selection of the work to which access was given. Two thousand abstracts were retrieved; about ten percent were finally selected as relevant after two successive readings of them all.

Each of the abstracts finally selected from the SIE and DDC materials together with supplementary abstracts and descriptive material from other agencies (in particular the National Science Foundation) was then indexed according to the revised taxonomy. The coding was done by a team of twelve professional indexers. Each abstract or project description was coded in terms of the following analytical dimensions:

Research function (research, development, etc.)
Topical area of study (educational goals, curriculum,
  learning, organization and administration, etc.)
Age-grade level of target group
Special characteristics of target group (if any)
Demographic area of intended impact
Curriculum subject matter fields

The taxonomy used for coding purposes had been under development in the Bureau of Research, USOE, over a period of 18 months. The particular version used for this project was a third generation effort. This exercise was the first full-scale test of the taxonomy; perhaps the most important outcome of the analysis is the recognition that it is now necessary to move to a fourth generation. Coding difficulties and ambiguities which cropped up as projects were being indexed contributed to a deepened understanding about the discreteness of certain categories and, occasionally, unintentional overlap among dimensions.

In view of these indexing problems it is important to underscore that *the analysis which follows is very much a beginning effort and should be taken as indicating orders of magnitude rather than exact amounts*. This is the first attempt to develop and apply a taxonomic analysis of educational research and development to the entire field. As successive analyses are undertaken in the future, it can be expected that both the taxonomy and the accuracy of the analysis based on it will undergo considerable refinement.

For coding purposes each dimension encompassed many more terms than are presented in the tables which follow. By collapsing categories under broader headings it has been possible to achieve greater accuracy although at a higher level of generality.

In the sections which follow, each table contains information respecting the allocations in FY 1968 of dollar awards to research and development categories in a given analytical dimension according to the sponsor of that award. Historical information in all dimensions is presented only for the Office of Education research programs. (The Office of Economic Opportunity is not presented in the tables at all owing to their incomplete listing in SIE and the difficulty of securing detailed project descriptions in time for the analysis. Historical data on the course content improvement activities of the National Science Foundation, being available, have been included in the appropriate section of this chapter.)

An Analysis of Educational R&D in Six Dimensions

Each of the six dimensions identified above is represented by two tables. In each case the first table shows the United States Office of Education's allocations according to that dimension over the life of its R&D program. (Because of the relatively low level of support, the first eight years of the program have been combined for purposes of this analysis.) The second table shows the FY 1968 allocations for that dimension according to the several sponsoring agencies. In the second tables the total amount analyzed in each case, $168,284,000, is smaller than the documented base estimate of $192.3 million (see Chapter VII). Two classes of funds have been omitted: the more than $14 million of OEO money and the sums added to the documented base estimate on the basis of NSF surveys of State and local governmental agency expenditures on educational research and development for which no abstracts are typically submitted to Science Information Exchange.

Some differences between the fiscal year totals for USOE in the analyses presented in this chapter and those presented in Chapter VII detailing the appropriation history of USOE should be noted. These discrepancies are caused by two circumstances. First, during the course of indexing the projects and verifying dollar awards for the early years of the program, it was found to be difficult on occasion to match fiscal data with program data. The consequence of this is a 4 percent error in the reporting of pre-1965 research for USOE. Approximately $2.3 million excess appears, therefore, in the first column in each of the tables showing the historical analysis of USOE awards. Closer examination reveals that the error is composed of over-reporting in the amount of $650,000 for Cooperative Research, $1.1 million for NDEA Title VI (research on modern foreign languages) and $500,000 for NDEA Title VII (research on new media). All years from 1965 through 1968 are accurate.

Second, discrepancies in a downward direction between listed appropriations and the figures reported for USOE from 1965 through 1968 occur as a consequence of a pair of circumstances. Construction monies appropriated in FY 1966 and FY 1967 were obligated in only small amounts. In addition, administrative decisions not to obligate appropriated funds were occasionally made as part of Government-wide attempts to hold back expenditure levels in FY 1967 and 1968.

Research Functions Supported

The categories presented in the tables in this section identify the several functions of research and development as defined in Chapter I. Research includes both conclusion-oriented and decision-oriented inquiry as well as applied research activities relating to development. The research category includes all USOE-supported research and development centers.

The development category includes the regional educational laboratories. In this category are all projects or programs which have as their aim

RESEARCH - W.F. Barry at Ottawa University received a grant to explore the relationship between neurological efficiency and intelligence. The long-range goal is to develop culture-free measures to assess intelligence.

RESEARCH - Frank Barron at the University of California, Berkeley, received support to explore relationships between esthetic sensitivity, visual acuity, esthetic literacy and other factors, to study the development of changes in these capacities, and to perform other kinds of basic research in the field of esthetic education.

RESEARCH - William Gephart at Phi Delta Kappa was awarded a grant to investigate the application of the convergence technique to reading research. The objective of the project is to develop a research logic and matrix.

DEVELOPMENT - Barry Beyer at Ohio State University received support for the development and testing of multi-media instructional materials, teaching guides, and content units on the history and culture of sub-Sahara Africa.

the production of materials, techniques, processes, hardware, or organizational structures for instruction and education designed to accomplish objectives which are part of the broader goals of education or instrumental to them.

Evaluation and achievement studies include the evaluation of Federal programs, major surveys and studies based on achievement data, such as Project TALENT, and other evaluations of educational programs or innovations.

The category for other dissemination activities includes activities that are not part of ERIC and cannot be classed as demonstrations. Targeted communications, traveling seminars, and institutes to train vocational and technical educators in new practices and techniques are included in this category.

The category for facilities and equipment includes support directed explicitly to the provision of facilities and equipment to assist research and development efforts.

Table 1 displays the history of USOE support according to research function supported. Several interesting points emerge from an examination of the numbers. The rapid growth in the proportion of the program devoted to development is one clear trend. It should be pointed out that this increase is not just a consequence of the establishment of the regional educational laboratories; almost twice as much development work was supported through projects alone in FY 1968 as was supported in entirety in FY 1965.

The amount allocated for facilities and equipment underrepresents actual appropriations by nearly $30 million. Construction funds once appropriated

EVALUATION - The United States National Student Association received a grant to develop valid and reliable methods for the evaluation of undergraduate curriculum and instruction. A 10-campus pilot tryout was part of the design.

DEMONSTRATION - A cooperative arrangement between Queens College and the New York City Board of Education demonstrated the effectiveness of school-university-teacher education cooperation for the training of teachers of disadvantaged children.

TABLE 1

USOE Support by Research Function
($ thousands)

CATEGORY	UP TO 1964	1965	1966	1967	1968	Total
Research	41,509	16,460	28,385	33,942	34,650	154,946
Development	24,791	12,133	29,441	33,380	44,404	144,149
Evaluation and achievement studies	4,639	3,013	4,485	4,219	4,531	20,887
Demonstrations	3,080	1,665	4,244	2,067	1,476	12,532
ERIC	-	-	1,970	3,050	2,845	7,865
Other dissemination	3,741	3,013	3,737	3,605	4,133	18,229
Research training	-	-	7,278	5,904	6,164	19,346
Facilities and equipment	238	83	1,256	2,507	1,680	5,764
TOTALS	77,998	36,367	80,796	88,674	99,883	383,718

EDUCATIONAL OBJECTIVES - Melvin Tumin and Marvin Bressler of Princeton University studied the relationship between educational and national goals. The aim was to develop guidelines for cross-cultural analysis of the effects of education on desired social outcomes.	COMPUTER ASSISTED INSTRUCTION - Patrick Suppes and Richard Atkinson of Stanford University received support for the development and evaluation of CAI in elementary mathematics, reading, and drill and practice exercises in mathematics and the language arts.

do not have to be obligated in that year, and a policy decision was made to hold the obligation of the monies until FY 1969 and 1970 to permit the detailed review of laboratory and center programs prior to award of the funds.

Table 2 shows the FY 1968 allocation by the several sponsoring agencies to research functions. If OEO obligations were included in this table they would significantly increase the totals for the development, demonstration, and evaluation categories. Nonetheless, it is clear that the bulk of educational development being supported is sponsored by USOE and NSF, and virtually all the dissemination and construction monies are obligated by USOE.

Topical Area of Study

The categories presented in Tables 3 and 4 in this section identify the topical areas of study on which the projects and programs in educational research and development are focused.

Table 3 displays the history of USOE support according to this dimension of analysis. Research and development centers were coded according to their focus, but the regional educational laboratories, owing to insufficient information in detail on individual programs at the time of indexing,were generally coded under the "Combination" category. "Not applicable" includes research training and dissemination. The bulk of the activities carried out by the laboratories is curriculum or instructional system development, but a fair proportion is also directed to the improvement of teacher education programs. Some work is also being done on organization and administration of schools. All three categories, therefore,

SOCIAL INFLUENCES - Susan Gray at George Peabody College received a grant for investigating, among other things, home environment factors in early childhood learning, and to experiment with the training of mothers of disadvantaged children.	GUIDANCE - Gordon Liddle received a grant to develop models of pupil personnel service for elementary schools. Special focus was on the varying requirements in urban, suburban, and rural areas.

TABLE 2

Research Function Supported, FY 1968
($ thousands)

CATEGORY	USOE	NSF	NIMH	NICHD	DOD	OTHER FED. AGENCY	FOUNDATION & OTHER	TOTAL
Research	34,650	5,821	9,719	7,919	3,676	2,009	7,841	71,635
Development	44,404	16,219	1,015	452	2,022	1,975	2,534	68,621
Evaluation and achievement studies	4,531	225	497	6	292	536	1,004	7,091
Demonstrations	1,476	901	254	-	-	335	81	3,047
ERIC	2,845	-	-	-	-	-	-	2,845
Other dissemination	4,133	160	375	-	6	130	246	5,050
Research training	6,164	-	-	-	-	1,740	361	8,265
Facilities and equipment	1,680	-	-	-	50	-	-	1,730
TOTAL	99,883	23,326	11,860	8,377	6,046	6,725	12,067	168,284

TABLE 3

USOE Support by Topical Area of Study
($ thousands)

CATEGORY	UP TO 1964	1965	1966	1967	1968	TOTAL
Not Applicable	2,774	994	11,258	11,293	11,673	37,992
Educational trends, needs, and objectives	5,700	5,822	6,081	9,684	8,113	35,400
The school as an institution	3,414	1,848	3,579	4,741	5,442	19,024
Educational Personnel	1,817	1,256	3,079	2,475	2,239	10,866
Instructional systems and practices, not further specified	22,111	8,858	14,879	12,186	14,949	72,983
Facilities & guidance	1,015	1,635	2,962	2,988	3,618	12,218
Curriculum	13,398	6,175	12,387	11,136	13,759	56,855
Computer managed or assisted instruction	1,272	1,197	4,222	2,246	2,759	11,696
ETV, ITV, tele-lecture	6,602	1,570	1,239	994	2,334	12,739
Social influences	3,350	1,390	3,244	1,759	2,223	11,966
Individual development and learning processes, human	14,602	4,933	7,968	8,404	9,056	44,963
-- , animal	123	22	-	41	33	219
Information sciences	722	433	431	2,054	283	3,923
Combination of above categories	1,098	234	9,467	18,673	23,402	52,874
TOTAL	77,998	36,367	80,796	88,674	99,883	383,718

TEACHER EDUCATION - D. Allen at the University of Massachusetts received support to develop a model elementary teacher education program. Emphasis is on specification of objectives, development of feedback measures, and program and individual evaluation procedures.	READING - C. Amsden at the California State College, Los Angeles, was supported to develop a reading program for Mexican-American children emphasizing oral language development. Stress also was placed on offering guidance to parents.

can be considered to be under-reported in this table for Fiscal Years 1966, 1967, and 1968.

Table 4 shows the allocations to topical areas for FY 1968 according to the several sponsoring agencies. The addition of OEO would increase substantially the allocations to instructional systems and the school as an institution. Examination of the table reveals that with the exception of NSF the vast majority of the work being done on curriculum and instruction was supported in FY 1968 by USOE (the categories here are instructional systems, together with curriculum and "Combination.") USOE supports about one-third of the work on human learning with a little more than a third being sponsored by NIMH and NICHD. USOE, however, provides virtually no support for animal studies of learning. Other areas in which USOE provides the bulk of the support are educational trends and objectives, the school as an institution, educational personnel, ETV and ITV, and research on instructional facilities and guidance and counseling.

Age-Grade Level of Target Group

The categories presented in Tables 5 and 6 in this section identify the age-grade or developmental levels of the target groups on whom research and development activities have focused.

Table 5 presents the history of USOE support for this dimension. Of interest is the dramatic increase in the support for early childhood research and development over the past three years. Early childhood and elementary together account for by far the largest single block of support.

ORGANIZATION AND ADMINISTRATION - Ronald Havelock and others received a grant to analyze the role requirements and information needs of "knowledge linkers" and to review the literature on linking processes in diffusion. The final product is to be a manual.	INSTRUCTIONAL PRACTICES - Ned Flanders at the University of Michigan studied theoretical principles of teacher influence on elementary school students. Interaction analyses formed the basis for the study.

TABLE 4. Topical Area of Study, FY 1968
($ thousands)

CATEGORY	USOE	NSF	NIMH	NICHD	DOD	OTHER FED. AGENCY	FOUNDATION & OTHER	TOTAL
Not applicable	11,673	194	699	341	479	92	2,134	15,612
Educational trends, needs, and objectives	8,113	392	13	54	63	338	1,971	10,944
The school as an institution	5,442	-	361	-	-	-	110	5,913
Educational personnel	2,239	51	-	-	-	13	124	2,427
Instructional systems and practices, not further specified	14,949	2,891	961	138	786	1,726	2,932	24,383
Facilities and guidance	3,618	-	826	-	12	175	224	4,855
Curriculum	13,759	14,947	6	-	173	1,271	2,951	33,107
Computer managed or assisted instruction	2,759	1,899	90	-	1,338	-	334	6,420
ETV, ITV, tele-lecture	2,334	104	-	-	16	736	90	3,280
Social influences	2,223	29	896	387	-	91	546	4,172
Individual development and learning processes, human	9,056	1,954	4,996	6,425	2,659	1,554	382	27,026
-- , animal	33	836	2,718	800	270	510	136	5,303
Information sciences	283	29	72	63	246	20	133	846
Combination of above categories	23,402	-	222	173	-	199	-	23,996
TOTAL	99,883	23,3[illegible]6	11,860	8,377	6,046	6,725	10,748	168,284

TABLE 5

USOE Support by Age-Grade Level of Target Group
($ thousands)

CATEGORY	UP TO 1964	1965	1966	1967	1968	TOTAL
Not applicable or identifiable	33,265	17,148	36,090	42,685	42,257	171,445
Early childhood (0-6)	1,546	984	5,742	10,954	14,997	34,223
Elementary	6,840	3,479	8,709	10,943	13,571	43,542
Intermediate or middle school	210	76	186	162	38	672
Junior high school	1,895	1,162	2,303	2,613	3,070	11,043
Senior high school	8,901	4,088	10,387	5,001	4,620	32,997
Elementary and secondary combined	6,681	1,740	6,119	7,405	9,572	31,517
Post-secondary	4,200	2,605	5,331	4,049	5,873	22,058
Undergraduate	4,708	994	1,228	1,594	2,251	10,775
Graduate	2,898	631	561	534	283	4,907
Adult	1,494	2,175	2,897	1,816	2,037	10,419
Articulation between levels	5,360	1,285	1,243	918	1,314	10,120
TOTALS	77,998	36,367	80,796	88,674	99,883	383,718

UNDERGRADUATE - Daniel Lerner at the Massachusetts Institute of Technology was supported to develop a basic social science course for undergraduate students in the natural sciences and engineering. Materials have heavy emphasis on audiovisual techniques and were tested through firsthand field observation.	ELEMENTARY-SECONDARY - Robert Gagne received a grant to investigate additional evidence for the conditions under which knowledge of learning hierarchies can be used to design instruction for school-relevant subjects.

The proportion of support going to undergraduate and graduate levels (that is, R&D on higher education) is relatively low, amounting to less than 10 percent of the activities which can be identified as targeted to educational levels.

Table 6 shows the allocations to age-grade levels for FY 1968 made by all sponsors. The addition of OEO programs would substantially increase the totals for early childhood and for elementary.

NSF clearly provides the bulk of the resources currently aimed at improving undergraduate instruction. NSF is also strong in the support of work aimed at secondary school. USOE, however, is particularly strong in post-secondary and in early childhood. (It is possible that there is some over-reporting in USOE's early childhood category since some of the regional laboratories were coded against early childhood, but the amount would not change the total by more than 20% and the reallocation would be to elementary.)

Special Characteristics of Target Groups

The categories presented in Tables 7 and 8 in this section identify target groups by special characteristics which may be relevant to the research and development work being undertaken.

Table 7 presents the history of USOE support for this dimension. It shows

UNDERGRADUATE - The Institute for Services to Education received a grant to design and develop curriculum materials for use in predominantly Negro colleges. The purpose is to remedy deficiencies caused by the students' previous experiences in intellectually undemanding environments.	ELEMENTARY - John Hough of Syracuse University received a grant to develop educational specifications for a comprehensive undergraduate and inservice teacher education program for elementary teachers.

TABLE 6

Age-Grade Level of Target Group, FY 1968
($ thousands)

CATEGORY	USOE	NSF	NIMH	NICHD	DOD	OTHER FED. AGENCY	FOUNDATION & OTHER	TOTAL
Not applicable or identifiable	42,257	3,234	8,339	4,464	5,182	2,516	5,847	71,839
Early Childhood (0-6)	14,997	434	967	1,729	-	385	610	19,122
Elementary	13,571	1,493	345	141	-	94	573	16,217
Intermediate or middle school	38	1,562	45	-	-	-	-	1,645
Junior high school	3,070	2,625	97	-	-	104	55	5,951
Senior high school	4,620	5,809	96	47	1	438	218	11,229
Elementary and secondary combined	9,572	685	443	289	-	50	597	11,636
Post-secondary	5,873	10	474	-	28	25	2,035	8,445
Undergraduate	2,251	6,819	261	107	18	448	52	9,956
Graduate	283	284	-	-	70	1,667	276	2,580
Adult	2,037	-	233	149	553	874	1,066	4,912
Articulation between levels	1,314	371	560	1,451	194	124	738	4,752
TOTAL	99,883	23,326	11,860	8,377	6,046	6,725	12,067	168,284

TABLE 7

USOE Support by Special Characteristics of Target Group
($ thousands)

CATEGORY	UP TO 1964	1965	1966	1967	1968	TOTAL
Not applicable or identifiable	65,962	28,615	58,362	65,319	72,811	291,069
Intellectually gifted	1,216	313	572	549	605	3,255
Physically handicapped (vision, speech, hearing, crippled, etc.)	1,533	1,098	2,658	2,848	5,419	13,556
Culturally deprived, socio-economically disadvantaged, etc.	1,022	1,986	11,437	13,120	14,722	42,287
Intellectually handicapped (retarded, brain damaged, not further specified, etc.)	4,741	1,499	2,529	3,355	3,215	15,339
Emotionally disturbed	323	496	937	652	824	3,232
Foreign language speakers	299	192	715	975	969	3,150
Other	2,902	2,168	3,586	1,856	1,318	11,830
TOTAL	77,998	36,367	80,796	88,674	99,883	383,718

BLIND - E. Foulke and R. Bixler received a grant to study the best methods for teaching compressed speech comprehension to blind school children. Factors affecting comprehension of compressed speech were explored.	DISADVANTAGED - Martin Deutsch evaluated the effectiveness of an enriched curriculum in overcoming the consequences of environmental deprivation. Focus was on the early years. Stress was placed on teaching techniques and classroom behavior.

a small but consistent amount of support for the gifted. It shows an expansion of emphasis on handicapped children which would be expected given the growth in categorical appropriations for handicapped research. The largest increase, however, is in research and development focused on the problems of disadvantaged target groups.

Table 8 shows the allocation of research and development activities sponsored by all agencies in FY 1968 to target groups bearing special characteristics. The addition of OEO projects would swell the disadvantaged category by $14 million thereby nearly doubling the figure shown here. The table would support the conclusion that special characteristic designationsappear to be far more important for USOE's programs than for most other sponsors, although NIMH and NICHD do show some support for the categories identified here.

Demographic Area of Intended Impact

Tables 9 and 10 show the allocation of project awards by several demographic categories which have proven of increasing interest in recent years. Table 9 shows the USOE historical record in this regard. Rural education has received some systematic attention, but the dramatic expansion is in research and development focused on urban needs and requirements.

Table 10 shows the allocations for all sponsoring agencies in FY 1968. The position of USOE in terms of allocations to categories such as these is perhaps not surprising, but it does indicate that, insofar as abstracts tell the story, proportions of support existing within USOE are not

BILINGUAL - The Southwest Educational Development Laboratory is developing a bilingual language education program, preschool through grade 6, with accompanying teaching procedures. Curriculum areas covered include math, science, social studies, etc., in both Spanish and English.	DISADVANTAGED - Researchers at the University of California, Riverside, investigated the factors contributing to adjustment and achievement in racially desegregated schools. Antecedents, concomitants, and consequences of successful integration were studied.

TABLE 8

Special Characteristics of Target Group, FY 1968
($ thousands)

CATEGORY	USOE	NSF	NIMH	NICHD	DOD	OTHER FED. AGENCY	FOUNDATION & OTHER	TOTAL
Not applicable or identifiable	72,811	23,326	9,433	5,257	6,046	5,215	10,719	132,807
Intellectually gifted	605	-	-	-	-	-	37	642
Physically handicapped (vision, speech, hearing, crippled, etc.)	5,419	-	134	207	-	521	-	6,281
Culturally deprived, socio-economically disadvantaged, etc.	14,722	-	661	601	-	426	1,013	17,423
Intellectually handicapped (retarded, brain damaged, not further specified, etc.)	3,215	-	886	1,785	-	100	80	6,066
Emotionally disturbed	824	-	351	-	-	-	136	1,311
Foreign language speakers	969	-	-	-	-	-	-	969
Other	1,318	-	395	527	-	463	82	2,785
TOTAL	99,883	23,326	11,860	8,377	6,046	6,725	12,067	168,284

TABLE 9

USOE Support by Demographic Area of Intended Impact
($ thousands)

CATEGORY	UP TO 1964	1965	1966	1967	1968	TOTAL
Not applicable or identifiable	75,090	34,397	72,377	78,649	86,941	347,454
Urban, not further specified	1,791	734	3,590	4,593	7,543	18,251
Central city	285	380	2,347	956	1,362	5,330
Suburban	149	82	57	131	4	423
Rural	683	774	2,425	4,345	4,033	12,260
TOTAL	77,998	36,367	80,796	88,674	99,883	383,718

TABLE 10

Demographic Area of Intended Impact, FY 1968
($ thousands)

CATEGORY	USOE	NSF	NIMH	NICHD	DOD	OTHER FED. AGENCY	FOUNDATION & OTHER	TOTAL
Not applicable or identifiable	86,941	23,326	11,587	8,264	6,046	6,271	11,169	153,604
Urban, not further specified	7,543	-	177	68	-	298	244	8,330
Central city	1,352	-	92	45	-	-	608	2,107
Suburban	4	-	4	-	-	156	31	195
Rural	4,033	-	-	-	-	-	15	4,048
TOTAL	99,883	23,326	11,860	8,377	6,046	6,725	12,067	168,284

URBAN - M.L. Bunday at the University of Maryland was supported to develop an experimental program for library science with special emphasis on the needs of urban poverty environments. Course work plus field experience were evaluated.

URBAN - R. Rosenthal at Harvard University was supported to study the development of aspirations and values in urban Negro and white adolescents. Methodology involved intensive interviewing of the boys and their reference individuals (family, peers, and teachers).

displayed by other sponsoring agencies.

Curriculum Subject Matter Fields

Tables 11 and 12 show the dollar awards for research and development according to curriculum subject matter fields. Table 11 shows the historical record for USOE and the FY 1968 picture for other sponsoring agencies (with the exception of NSF) which showed dollars by these categories. The emphases on basic knowledge and skills, languages, the social sciences, occupationally specialized curricula, and R&D related to curricula for the preparation of teachers and administrators are clear foci for USOE R&D programs. (The amount shown for education professions curriculum areas, however, is inflated in some degree. This is a consequence of some misunderstanding in the coding of project activities. Projects were sometimes assigned to these areas not only if they were in fact working directly on curriculum for teacher preparation but also if the project was judged to have bearing on the development of curricula for the category coded. Exactly how much of an over-count is present can only be determined by detailed analysis; suffice it to say that there is some excess.)

Increases in levels of support can be seen in the occupationally related curriculum areas. Emphasis on language arts shows steady growth. Mathematics and the natural sciences relative to other disciplines show smaller absolute amounts owing to the National Science Foundation's responsibilities in these areas.

Table 12 shows the historical record for the Course Content Improvement

RURAL - The Northwest Regional Educational Laboratory received a grant to survey research and development efforts in rural shared services. The data collected were evaluated, synthesized, and translated into easily readable information packages for widespread dissemination in rural areas.

URBAN - R. Kimbrough at the University of Florida, Gainesville, was supported to study changes in organizational structures of large school systems with special reference to problems of teacher militancy and organizational conflict. The aim is to better illuminate the newly emerging role of the superintendent.

VOCATIONAL - M. Crawford at George Washington University received a grant to develop a taxonomy of vocational-industrial eduction objectives to provide a framework for evaluating and comparing existing programs and to serve as a basis for radical new departures.

PHYSICS - G. Holton and others were supported by NSF and USOE to develop a second major curricular approach to the teaching of high school physics to provide for an alternative approach to that offered under PSSC.

Program of NSF. The emphasis on mathematics and the natural sciences is clear, but in later years, particularly at the secondary level, there is substantial support for the social sciences. Changes in emphasis are visible also in the increasing support in later years of the program for college and university course content efforts. The table would also indicate a movement in the direction of coordinated sequences for mathematics instruction rather than independent work at different levels of schooling.

Summary

As this analysis was undertaken, several things were learned. The taxonomies used require further revision and sharpening. The instructions for their use need to be prepared with greater care.

More important, however, was the discovery that attempting these kinds of tasks raised at least as many relevant questions as they answered. The "fit" of a research and development program, in the larger sense of its relationship to major social and educational priorities, can in part be assessed by making examinations of the kind initiated through this chapter. Identifying allocations of funds and using the questions that arise from an examination of the figures to stimulate program reviews is an important way of improving the focus and thrust of an ongoing research and development effort.

SOCIAL STUDIES - E. Fenton at the Carnegie Institute of Technology was supported to develop curriculum materials for able high school students. The curriculum is to be sequential and cumulative, organized around basic concepts. Special emphasis is on teaching modes of inquiry basic to the social sciences.

SOCIAL STUDIES - Donald Oliver received a grant to develop a law and social science curriculum based on the analysis of public issues. Special attention was paid on the problems of evaluation. Varying instructional approaches will be tried.

TABLE 11. Curriculum Subject Matter Fields, FY 1968
($ thousands)

CATEGORY	UNITED STATES OFFICE OF EDUCATION TO 1964	1965	1966	1967	1968	OTHER SPONSORING AGENCIES, 1968 NIMH	Other Fed. Agency	Foundation & Other	Total FY 68
Not applicable	31,799	12,391	35,379	41,697	48,651	9,649	1,776	5,826	65,902
Basic Knowledge and Skills									
More than one field	2,794	2,154	6,823	12,373	12,905	148	436	10	13,499
Language arts	5,114	3,306	5,182	8,321	9,880	254	811	343	11,288
Foreign languages	455	33	605	761	427	-	-	-	427
Mathematics	152	634	1,240	562	287	-	-	7	294
Science	1,190	261	803	608	280	-	-	76	356
Social Studies	524	429	859	933	665	-	-	-	665
Other	845	204	581	65	99	557	753	550	1,959
Academic Skills									
More than one field	2,219	1,530	3,392	2,7[illegible]	2,533	-	-	130	2,663
The arts	907	605	1,671	2,388	1,860	-	135	145	2,140
Languages	14,457	228	1,591	1,103	795	-	-	540	1,335
Humanities	151	249	387	244	144	-	45	11	200
Mathematics	1,481	125	455	120	49	-	347	7	403
Natural Sciences	683	605	2,488	1,370	1,171	-	-	24	1,195

TABLE 11. Curriculum Subject Matter Fields, FY 1968 (cont.)
($ thousands)

CATEGORY	UNITED STATES OFFICE OF EDUCATION					OTHER SPONSORING AGENCIES, 1968			
	TO 1964	1965	1966	1967	1968	NIMH	Other Fed. Agency	Foundation & Other	Total FY 68
Social and Behavioral Sciences	1,449	1,036	1,705	1,147	1,944	1,207	-	342	3,493
Other	234	384	752	409	554	-	25	39	618
Occupational Specialized									
Agriculture	7	488	442	336	221	-	-	-	221
Business and Office	1	240	574	85	205	-	-	-	205
Distributive	-	-	117	31	40	-	-	-	40
Health	438	321	814	436	512	45	1,198	1,344	3,099
Social Services	-	-	-	47	234	-	737	-	971
Recreation Services	-	-	-	-	74	-	-	-	74
Technical Occupations	1,050	6,785	7,295	6,617	6,839	-	-	834	7,673
Architecture, Engineering, etc.	65	234	-	61	367	-	-	-	367
Home Economics	40	478	360	364	243	-	-	-	243
Education Professions									
Curriculum Areas not further specified	1,041	366	1,203	940	1,125	-	24	21	1,170
Ed. Psychology	969	227	236	204	207	-	-	-	207

TABLE 11. Curriculum Subject Matter Fields, FY, 1968 (cont.) ($ thousands)

CATEGORY	UNITED STATES OFFICE OF EDUCATION					OTHER SPONSORING AGENCIES, 1968			
	TO 1964	1965	1966	1967	1968	NIMH	Other Fed. Agency	Founda-tion & Other	Total FY 68
Ed. Sociology	363	387	224	232	140	-	9	-	149
Ed. Administration	1,638	789	673	350	842	-	-	5	847
Curriculum and Instruction	6,130	1,187	3,428	3,094	5,410	-	297	1,746	7,453
Guidance and Counseling	382	158	124	16	60	-	-	3	63
History of Ed.	227	9	10	-	-	-	-	1	1
Philosophy of Ed.	11	36	48	25	6	-	-	-	6
Learning Theory	556	173	165	120	14	-	-	6	20
Other Curriculum Areas	626	315	1,170	887	1,100	-	132	57	1,289
TOTALS	77,998	35,367	80,796	88,674	99,883	11,860	6,725	12,067	130,535

TABLE 12. Support for Curriculum Subject Matter Areas. National Science Foundation
($ thousands)

CATEGORY	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	TOTALS
All levels (El. thru College)											
Mathematics	143	-	-	-	-	174	145	1,192	2,878	3,887	8,419
Biology	18	-	-	-	-	-	-	-	-	-	18
Interdisciplinary	11	-	-	-	-	-	-	-	-	-	11
Social Sciences	-	-	-	-	-	-	300	-	-	-	300
Elem and Jr. High											
Mathematics	441	305	199	835	900	1,262	1,062	461	-	-	5,465
Science	123	151	5	912	1,606	2,294	3,576	2,026	3,810	5,267	19,770
Interdisciplinary	-	-	-	-	-	-	769	680	-	-	1,449
Social Sciences	-	-	-	-	433	946	-	-	-	-	1,379
Secondary											
Physics	2,754	350	-	201	168	326	195	28	500	175	4,697
Biology	813	1,280	363	2,023	1,836	989	919	830	1,183	294	10,530
Chemistry	144	928	1,115	961	682	65	75	-	-	37	4,007
Earth Sciences	-	15	-	-	198	584	700	1,030	755	673	3,955
Mathematics	939	1,493	1,415	951	794	1,755	1,377	760	-	-	9,484
Interdisciplinary	14	-	-	107	9	326	20	945	461	267	2,149
Other	-	-	-	-	-	-	101	-	-	185	286
Social Sciences	-	-	-	60	19	574	50	2,439	1,533	2,079	6,754
College and University											
Biology	17	114	108	28	158	71	35	1,397	1,013	524	3,465
Chemistry	46	34	3	91	36	36	202	340	848	150	1,786
Earth Sciences	-	-	127	42	49	49	114	378	235	419	1,413
Engineering	52	172	310	386	748	748	711	1,449	1,250	1,883	7,709
Mathematics	7	350	-	383	376	376	2,286	1,358	1,292	1,072	7,500
Physics	24	121	786	213	621	621	1,765	674	993	1,997	7,815
Social Sciences	101	14	-	14	37	37	105	62	384	231	985
Interdisciplinary	21	-	-	54	-	-	212	344	782	324	1,737
Other	-	-	-	90	24	24	-	-	-	-	138
Films and TV	1,561	661	1,000	1,435	2,644	3,164	(Included in above figures)				10,465
Equipment	407	315	737	605	332	36					2,432
TOTALS	7,636	6,303	6,168	9,391	11,670	14,457	14,719	16,393	17,917	19,464	124,118

Chapter IX

THE IMPACT ON EDUCATIONAL POLICY AND PRACTICE

Assessment of the effects of research and development on American education can be approached in two ways. The first would consider general questions of the degree to which behavioral and social science knowledge correlates with observable change in instructional practice or the organization and administration of schools. Is it possible to identify, for example, the ways in which the disciplines of psychology, sociology, or philosophy have altered our understandings of human beings as learners in school and university settings? Can we then trace in our educational institutions changes in practice and procedure which at least bear some logical relation to conceptual evolution in the disciplines fundamental to education?

A second approach seeks out specific innovations growing out of research or developed through rigorous scientific procedures of design, constructions, and trial, and then attempts to ascertain the degree to which such innovations have in fact been adopted by schools and colleges across the country. This approach would assess the degree to which schools adopt and use such materials as PSSC physics, such techniques as discovery or inquiry learning, or such organizational arrangements as non-grading or team teaching.

The first approach is necessarily somewhat impressionistic; the second allows some kind of quantification. Both approaches have been followed in this chapter. They are supplemented by a special survey commissioned for this report.

Assessment of the Effects of Inquiry

At least two provocative analyses of the effects of basic, fundamental or conclusion-oriented inquiry on educational policy and practice are available. One of these is a draft paper prepared by J.W. Getzels of the University of Chicago, "Paradigm and Practice: On the Contributions of Research to Education." The second is in the study prepared by the National Academy of Education, Research for Tomorrow's Schools: Disciplined Inquiry for Education cited in Chapter I.

The Power of Learning Paradigms

Getzels' analysis begins with the statement of a peculiar paradox. On the one hand, Benjamin Bloom, in his presidential address to the American Educational Research Association, inventoried educational research during the preceding 25 years, found 70,000 titles, and concluded that only 70, or one out of a thousand, had any significant influence.[1] On the other, Getzels expressed his conviction, drawing substantially on a study by T.S. Kuhn,[2] that the "significant influence of research comes not piecemeal, study by study and practice by practice. It comes rather cumulatively through altering the general conceptions -- what T. Kuhn calls the paradigms -- of human behavior which serve as the context for educational practice."[3] The remainder of Getzels' paper relevant to this chapter presents a two-part analysis.

The analysis begins with the proposition that "the kind of learning experience and the kind of learning environment we attempt to provide in the classroom depends in no small measure on the kinds of conceptions we hold of the human being as learner." It ends with illustrations of the way in which classroomshave changed during the past half-century "that were concomitant with certain changes in the conception of the learner during the same period - changes that were at least in part a function of accumulated educational research."[4]

Getzels points out that at the turn of the century the dominant conception of the human being as learner was that he "was psychologically an 'empty organism' resonding randomly to stimulation, and learning only when specific responses were connected to specific stimuli through the mediation of pleasure or pain."[5] This is the connectionist conception of the learner in whom discrete stimuli and responses are associated through the mediation of rewards and punishments under the control of the teacher.

Learning was thus viewed as being teacher centered. Prevailing methods and materials of instruction and even the school buildings and classroom

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1 Benjamin S. Bloom, "Twenty-five Years of Educational Research," American Educational Research Journal, Volume 3, Number, May 1966, p. 218.

2 T.S. Kuhn, The Structure of Scientific Revolutions. Chicago: University of Chicago Press, 1962.

3 J.W. Getzels, "Paradigm and Practice: On the Contributions of Research to Education," mimeographed, p.2. Permission of the author to quote from his paper is gratefully ackowledged.

4 Idem.

5 Ibid., p. 3

furniture, Getzels points out, were so structured. The typical classroom found the teacher placed in front of the classroom and the pupils in chairs (often fastened to the floor) facing forward so that they could attend to the source of their learning experience - the teacher.

The transformation from teacher-centered learning to learner-centered learning did not occur, says Getzels, "because someone just happened to have a bright idea that change in the appearance of the classroom might be a good thing, or that children in movable chairs were easier to discipline than children in fixed chairs, or that there were any specific studies showing that children in movable chairs learned more readily than children in other kind of chairs."[6] The important change was a transformation in our conceptions of the human being as learner. The connectionist concept of the learner did not account for all the observed behavior in learning. Understanding about "patterns" or "Gestalt" crept into our ideas about human learning: individuals did not always experience aspects of what they were to learn as discrete stimuli.

Furthermore, personality theory was developing postulations that by no means regarded the human being as an "empty organism" psychologically. Rather than depending on reward and punishment as mediators for establishment of S-R bonds, learners began to be viewed in terms of needs, attitudes, values, interests, conflicts, and other conscious and unconscious psychic forces.

"The paradigm of the learner as a psychologically 'empty organism' was transformed into the paradigm of the learner as a psychologically 'dymanic organism.'"[7] Learning was not only connective, but also affective. From this point of view the learner became the center of the learning process, not the teacher. Not surprisingly, the ideal school underwent something of a revolution during this period. Classrooms became student-centered. Practices which made a great deal of sense under a teacher-centered structure gave way.

A third shift in the structure of schools occurred when the paradigm regarding learning shifted once again. The new shift, which Getzels believes is just now going through its closing stages, views the learner and learning as group-centered. "The child as learner was conceptualized as a social being, and learning as occurring through social interaction, each person in a classroom serving as a stimulus for every other person in the group."[8]

Again changes in architecture, curriculum, and learning practices could be observed. The objectives of education became more socially oriented, learning processes became more group-centered, and classroom and school design altered to accommodate the new paradigm.

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7 Ibid., p. 6

8 Ibid., p. 7

Getzels concludes his illustrations by noting that the "periods" he describes are by no means as sharply defined as his brief schematic outline might suggest. The point is quite simply that both "research and educational practice were related to paradigmatic alterations, and that the paradigmatic alterations must be taken into account when considering alterations in research and practice."[9]

Similar kinds of analyses are explored in Research for Tomorrow's Schools: Disciplined Inquiry for Education. Of particular interest to the NAE research committee responsible for preparing the report was the degree to which evidence could be developed to illustrate the impact of conclusion-oriented inquiry on educational practice. Four examples are in their study; two of them are briefly summarized here.

Mental Testing and Pupil Classification[10]

The National Academy of Education report identifies the evolution of ideas on testing as a development which began in the study of natural history and pioneering work in anthropology and genetics. New directions have grown out of mathematical research. Work in psychology and sociology has also been prominent in its growth. The report documents the following developments.

The beginnings of the testing movement are found in Darwin and the theory of natural selection. The development of the idea of natural selection, and its application beyond the scientific context in which Darwin justified it, soon led to notions about the importance of superior individuals upon whom social progress most depends. The idea of using mental tests to select Civil Service employees was proposed by Galton to place leadership of government in the "proper" hands. It would take fifty years for the idea to bear fruit.

Galton launched a massive program of empirical research, testing thousands of individuals to obtain the most basic descriptive facts on the variation in human abilities. Others pursued similar research in the attempt to isolate such elements as reaction time, discriminative skills, and the like.

Tests on simple functions yielded discouraging results. Not until Binet's work in the 1890's concentrated on complex processes was there any success. Once Binet concluded that tests of attention, reasoning, and judgment showed the proper correlates expected of a measure of intelligence, psychology was ready to be of assistance to the educator. The tests which Binet and Simon developed at the request of Paris school officials to distinguish between mental defectives and capable but under-stimulated students were successful because they offered controlled, impartial, and repeatable procedures to replace impressionistic evaluations.

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[9] Idem.

[10] This material is drawn from Lee J. Cronbach and Patrick Suppes, editors. New York: The Macmillan Company, 1969. Op. cit., pp. 73-87.

American psychologists moved to exploit the Binet breakthrough. The belief in the new tests and the conviction that they did indeed measure intelligence explains the rapid and enthusiastic adoption by schools of the new technology of differentiation. Schools came to accept IQ as an index of what could be expected from a child. But then it came to pass that the tests began to determine children's fate rather than merely forecast it. Tests came to be judged by their ability to predict subsequent grades, and test items became increasingly narrowed to those activities for which schools gave direct training.

Very early in the history of testing it was recognized that children from poor environments might be denied opportunities as a consequence of their performance on the tests. Psychologists recognized that they were always measuring acquired intelligence and inferring differences in native endowment, but testers were not always as scrupulous in their recognition of this abstraction in the application of tests in concrete situations.

Much of the investigation relating to intelligence testing bears on the issue of whether a general ability is involved or a broad range of independent abilities. Work is still ongoing to chart the range and variability of such independent abilities. Perhaps just as interesting is the work which has explored the validity of test profiles not only in relation to particular kinds of later achievement but also in terms of the particular environments in which the achievement was being pursued.

The main practical outcome of these secondary researches was the insistence on local studies to determine what aptitudes as indicated by various profiles seem to be critical for particular local courses of study. The fact that success in given courses in different colleges, for example, depended on different things raises important questions about the original Galtonian assumption about mental testing for the selection of the superior individual. For what the local studies have shown is that fitness clearly depends on the particular demands of a particular environment. Thus college selection, for example, is a matter of proper guidance, not just the skimming off of the best student to the best institutions and so on down the line.

The careful useof detailed follow-up data reduced to an intelligible form opens new possibilities for testing to be of direct service to individuals. Careful collection of data about ranges of student abilities in a given institution, survival rates, and distributions of remaining students can provide prospective students with information which can help them match themselves much more certainly to appropriate colleges.

The Philosophy of Pragmatism

A second example of the impact of conclusion-oriented inquiry on education practice, drawn from the NAE study,[11] is primarily concerned with the work of Charles Sanders Peirce, founder of the philosophy of pragmatism. Peirce's central concern lay in clarifying the relevance and implications of scientific logic for critical thought and action. Peirce's conceptualizations in this regard are now widely recognized as fundamental elements of scientific thought: a rejection of the idea that findings can ever be certain or final, emphasis on probability, on hypothetical reasoning, a conception of operational definition, a public notion of science as a community of investigators, a problem approach to inquiry, and a view of axioms as tentative assumptions to be tested by experience.

Peirce himself did not translate his ideas into educational terms; that came later through the intermediaries of James and Dewey. But that they lie at the heart of pragmatic notions of schooling can readily be seen. The linkage between thought and action, problem-centered methods of instruction, rejection of the quest for certainty and the substitution of the development of more probabilistic modes of reasoning, the importance of publicly available evidence, and the fundamental stress on modes of inquiry rather than on the products of inquiry are all outgrowths of ideas Peirce first developed as a philosopher.

Much of Peirce's work was aimed at rationalistic, Cartesian philosophy. Peirce questioned radical doubt as the starting point; he asserted that it was impossible to wipe the mind of all belief, that quite to the contrary we always started with all the prejudices we have acquired over time. But after inquiry proceeds for a time, certain of the assumptions we previously accepted may be called into question. At that point we lift them out of their imbedded status and examine them independently to test their validity.

Peirce rejected individual subjective consciousness as the basis for truth in favor of public criteria available to a community of scientists. He insisted upon the fundamental significance of circumstantial evidence of all kinds rather than on the Cartesian concept of the power of deductive reasoning from indubitable foundations. Certainty is replaced by fallible hypothetical assumptions, subjective individual conviction by public agreement in an informed community, and linear by circumstantial reasoning.

Out of these views grew Peirce's notion of meaning, an idea which has since become known as "operationism." Simply put, the meaning of any idea or object is its effects. The conception of the effects of an object is the whole of our conception of the object, says Peirce.

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[11] This material is drawn from *ibid.*, pp. 88-95.

Here is the heart of the significance of Peirce's philosophy to education. Mere familiarity or verbal definition is not sufficient to explain concepts to children or indeed to sustain any conviction that they have learned what we have intended. On the contrary, in order to insure productive learning the ideas need to be concretely related to the child's actions and his expectations of ensuing consequences. He must, therefore, have opportunities to act and to perceive directly the consequences of such actions if meanings and concepts in Peirce's terms are to be learned. The centrality of these notions to later progressive views is clear as it relates to the importance of purposive units of study which permit individual children to act and observe the consequences of their action as the soundest basis for learning. It is important to note, however, that Peirce himself did not develop the educational implications of his ideas; that was done by others. His initial motivation was theoretical; his intent was to spell out the significance of scientific standards and practices for a modern theory of knowledge.

Early Learning

A fourth example of the impact of research on education is to be found in the long line of inquiry into the development of selected human characteristics, particularly those having to do with mental and emotional development. These have been conveniently reviewed and summarized in Benjamin S. Bloom's Stability and Change in Human Characteristics.[12]

This book, summarizing the research undertaken in preceding decades, reviews and analyzes approximately 1000 longitudinal studies relating to the development of selected human characteristics. Taken as a whole, these 1000 studies provide us with what is known, quantitatively, about the development of the selected characteristics in man from birth to adulthood.

Bloom's study concludes that some of the most significant human characteristics develop most rapidly during the first five years of life and that measurements of change are highly related to the relevant environmental conditions in which individuals have lived during the change period. Any change in the development of human characteristics becomes more difficult with increasing age or development.[13]

Bloom's findings suggest the great importance of the pre-school and early school years in the development of learning patterns and general achievement. Failure to undergo appropriate achievement, learning, or development in these years is likely to lead to continued failure or near failure throughout the remainder of the individual's school career. The research underscores the tremendous implications of these findings vis à vis the development of powerful and effective learning environments for the early years. Bloom also suggests, however, that since the studies are based on surveys and norms, vigorous experimentation may lead to different conclusions about what can be done at later ages.[14]

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[12] Benjamin S. Bloom, Stability and Change in Human Characteristics. New York: John Wiley & Sons, Inc., 1964.

[13] Ibid., pp. 204, 205, 209.

The effect of this long line of research (and perhaps, indeed, Bloom's summary of it) is clearly visible on the American education scene. It is no accident that one of the primary strategies adopted by the Office of Economic Opportunity was the development of the Head Start program designed to develop capabilities in young children which will help to insure their success in regular education programs.

The conviction regarding the tremendous significance of the early years grew out of a large number of studies. Bloom's summary was a key event, but the readiness for its reception was in no small measure the consequence of the considerable amount of work which had been going on and which had contributed to the creation of a broader sense of public awareness on the subject.

Assessment of the Effects of Development

A number of examples exist of innovations which have either been rigorously developed in the R&D tradition or whose outlines have been suggested as a consequence of our growing understandings about human learning and motivation. Several of these are identified below. Insofar as they exist, data are presented on the degree of adoption of the identified practices or innovations.

Language Laboratories

A study of public school programs and practices completed by the Research Division of the National Education Association disclosed, for example, that of school systems enrolling 12,000 or more pupils in the United States, 85.5 percent provided foreign language laboratories with individual pupil stations.[15] In 1966 four hundred systems reported on this question, out of an estimated 471 in this category; school systems of this size in the United States enroll approximately 18 million of the 43 million public school pupils. Language laboratories and the techniques devised for their use were developed through support provided under the two authorizations of the National Defense Education Act, for research on the uses of new media and on modern foreign language instruction.

Team Teaching

Team teaching is an organizational arrangement for instruction which can be traced to (1) developing understandings about disparities in rates of learning, (2) the recognition of the importance of providing more flexible arrangements to facilitate different forms of instruction, and (3) a realization that cooperative diagnostic arrangements regarding individual students could lead to better planning and delivery of instruction. Surveyed in 1966, 85.9 percent of the elementary schools and 83.8 percent of the secondary schools in the estimated 12,130 school systems enrolling 300 or more pupils reported that no team teaching practices were provided. Eight and 7/10 percent of the elementary schools reported team teaching was available to all students who were eligible and 11.0 percent of the secondary schools so reported.[16]

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[14] Ibid., pp. 217-218.

[15] "Public School Programs and Practices," NEA Research Bulletin 45: 103-126, December, 1967, Table 8.

Nongrading

Nongraded organizational patterns, especially at the elementary level, are also an outgrowth of our increased understanding of differential learning rates and the need to adopt more flexible arrangements to create more effective individualization of instruction. A sample of the 12,130 systems with over 300 pupils enrolled revealed that 8.1 percent of the systems had nongraded organizations available to all eligible individuals. The proportion increased rather significantly to over 13 percent in school systems enrolling over 3,000 students. The program was available to some students in all the districts at a level of an additional 4 percent, but districts of over 25,000 reported an additional 22.7 percent had such access, and districts between 3,000 and 24,999 reported an additional 12.4 percent.[17]

Programmed Instruction

Another example of impact may be found in the measures of usage of programmed instructional materials in school systems enrolling more than 300 pupils. Slightly more than 10 percent of the elementary schools in the systems in the sample reported that such materials were available to all children who were eligible; the corresponding figure for secondary schools was 12 percent. If those systems which provide some access to programmed instruction are included in the totals, the percentage for elementary schools rises to 16.5; the secondary school figure rises to 21.8 percent.[18]

Curriculum Material Supported by NSF

Further information concerning the impact of educational development can be found in materials prepared by the National Science Foundation to assess the effects of four major Course Content Improvement Projects-CHEM Study, BSCS Biology, SMSG Mathematics, and PSSC Physics.

From the introduction of the hard-cover edition of the CHEM Study text in 1963 to the 1967-68 school year, the number of students using the course materials has increased from 45,000 to 500,000. NSF estimates that 50 percent of the total number of chemistry students in the Nation are learning from the CHEM Study course. As of September 30, 1968, the total number of written materials for this course that have been sold were:

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[16] Ibid., Table 9.

[17] Ibid., Table 12.

[18] Ibid., Table 14.

Text -- 754,634 copies
Lab Manual -- 1,055,112 copies
Teachers Guide -- 20,115

Ten to twelve thousand schools are using the materials in the fifty States together with five Canadian provinces and two states of Australia. Film sales stand at 23,885 and rentals of films now total 105,757.

Further evidence of impact can be found in the drive to alter and revise college instruction in chemistry as a result of the wide use of CHEM Study materials. The prefaces of several new texts in first-year college chemistry pay explicit attention to the requirements and pressures for change in the basic college chmistry course that CHEM Study and the Chemical Bond Approach (CBA) have created.

SMSG mathematics has secured similar figures on gross sales of published text materials. Table 1 presents the totals.

Table 1

SMSG Gross Sales Report - Yearly July 1-June 30

1961-1962	532,490
1962-1963	706,462
1963-1964	904,653
1964-1965	727,502
1965-1966	689,740
1966-1967	276,712
1967-1968	237,795

All other publications sold by SMSG have totaled an additional 901,272 items. Film sales have totaled 1,887 and rentals another 7,635.

Changes in college courses similar to those reported in chemistry are occurring in mathematics. The pressures come, of course, not just from the existence of the SMSG and other new mathematics curricula. Other forces would have made such alterations necessary, but it is just as clear that SMSG and its counterparts have done much to facilitate the changes at the undergraduate level.[19]

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[19] A not altogether frivolous piece of evidence of the widespread popular awareness of developments in mathematics instruction is the frequent reference to "New Math" in the popular comic strip, Peanuts.

The picture regarding the impact of BSCS biology is much the same. Estimates range from 2½ to 3 million students taking biology annually in American secondary schools. By late 1968, over 2,271,000 BSCS high school biology texts had been sold. Total sales since general release of BSCS materials to late 1968, the last period for which hard data are available, number 3,372,049. In addition, some 24,209 copies of the Single Topic Inquiry films developed by BSCS and released in 1968 have been sold.

Again, evidence of the impact of BSCS can be found in alterations in college courses resulting from the introduction of the new materials in high schools across the country. The receptiveness of the Commission on Undergraduate Education in the Biological Sciences to BSCS has increased stimulation at the college level to revise course content and methodology to capitalize on improved biology instruction in the high school.

Data on the use of the PSSC physics course in the United States is contained in an article by Uri Haber-Schaim.[20] The total sales figures of books and materials are judged to be misleading since many of the books sold in the early 1960's are likely to have been replaced and much of the equipment (for example, the ripple tanks) are being used outside of the program.

In estimating students enrolled in the school year 1966-67 Haber-Schaim used four different measures.

The number of achievement tests sold, corrected for percentage still being used according to the year purchased, would yield an estimate of between 180,000 and 224,000 student users. These tests tend to project a lower limit for use of the course, since they are not used outside of the program.

Sales of two equipment kits (the Inertial Balance Kit and the Collision Kit) would yield estimates of 116,000-145,000 and 152,000-190,000 student users, respectively.

A fourth measure, book sales, was also employed. After similar corrections for use-percentage depending upon date of purchase as were employed for achievement test sales, Haber-Schaim estimates that 285,000 students were using the course in 1966-67.

More Programmed Instruction

Finally, a recent analysis of the use of programmed instruction reports data from surveys conducted in 1962 and 1963 which revealed that 11.4 percent of the 1,830 school sample surveyed reported some use of programmed instruction, 80 percent of that use, however, being on an experimental or small-group basis. In 1963, 36.4 percent of a 1,686-school sample reported some use. The major use of programs was at the junior-senior high school level.[21]

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[20] Uri Haber-Schaim, "The Use of the PSSC Physics Course in the United States," The Physics Teacher, February, 1968, pp. 66-67.

Studies of more specific populations reveal similar findings. In 1965-66 a study conducted by the Texas Education Agency reported 27 percent of 1,312 school districts in Texas were using or planning to use programmed instruction materials. A 1966 study of the use of programmed materials in foreign language instruction surveying 378 school systems with 5000 or more students found that fourteen percent of the 249 respondents used or planned to use such materials.[22]

Of some interest are the findings relating to the use of programmed instructional materials in industry. A 1963 survey of 370 companies selected randomly from Fortune's list of the 500 largest companies in the United States (response rate: 277) revealed that 40 percent had used or planned to use some form of programmed instruction. Only 30 percent, however, reported use on a full operational basis. More recent studies reported 20 percent current use.[23]

A Special Survey

Anticipating the results of our more extensive literature search for evidence of the impact of educational research and development on the schools of the Nation, a special survey was commissioned through the Policy Institute of the Syracuse University Research Corporation. The survey was conducted by the Bureau of Social Science Research as part of a larger project conducted by the Policy Institute. The survey was conducted between November, 1968, and May, 1969.

Methodology and Scope

Based upon a carefully selected stratified sample representing the more than 9,000 U.S. school districts with student populations between 600 and 100,000, the research drew upon (1) interviews with 55 school superintendents and (2) completed mail questionnaires from 342 school superintendents.

The 55 interviews were conducted in selected typical districts with varied enrollments in all nine regions of the country. The target sample for the more extensive mail survey was selected from a population of 9,088 operating districts for 1968/69 encompassing 33.7 million elementary and secondary students. The 342 returns constitute a well distributed coverage of all size categories in the sample, and, except where specifically stated otherwise, serve as the basis for all data used herein.

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[21] Mary Louise Marino, "Trends in the Use of Programmed Instruction," The Schools and the Challenge of Innovation. New York: Committee for Economic Development, 1969, p. 204.

[22] Idem.

[23] Ibid., p. 209.

Among the subjects investigated in both interviews and questionnaires were (1) the degree of utilization of the outcomes of R&D, (2) the superintendents' views of the strengths and weaknesses of R&D, and (3) the sources of information used by the superintendents to learn of current research on education.

Utilization of Educational R&D in the Public Schools

One of the clearest conclusions to be drawn from the 55 interviews is that school superintendents generally do not identify innovative classroom programs and practices with specific research activities. A question in the interview schedule asked the respondents to state which innovations in their districts were derived directly from educational research. The responses indicated that many respondents found the question a confusing one. On the one hand, superintendents were uncertain about what was meant by "educational research" and how they were to interpret or substantiate the derivation of practice from previous research. On the other hand, comments like "obviously, someone must have done some research on it," or "We know it was tested (or tried) before we introduced it" suggest that school administrators are not consciously aware of any connection between the operations of their school system and educational research activities.

In the questionnaire survey a related question asks for the identification of results of education R&D having widespread influence on school practices in this country. Sixty-four percent of the respondents, weighted as national projections,[24] gave no response at all. Only 3.1 percent of weighted national projection named even one specific research project.

A clear and consistent variation was found between the responses of superintendents of the larger districts as opposed to those from the smaller districts. As might be expected, superintendents from the larger districts have more information; those from the smaller districts have less.

More important, however, than the ability to name specific linkages between research and practice is the degree to which the fruits of educational R&D are actually being utilized by the superintendents in the day-to-day operation of their school systems. On this point the data show some fascinating results. In the area of innovative teaching practices, the most widely adopted in rank order were teacher aides, ability class groupings, and elementary departmentalization. In each of these cases, well over half of the respondent districts are employing these methodologies, and as Table II demonstrates, the largest proportion of that use is characterized as "extensive" rather than "limited."[25] In regard to each of these three most popular of the new teaching practices, the percentage of the utilization remains constant across district size differentials. In the smallest as well as the largest school districts, teacher aides are equally in use. When one looks further down the rank order of teaching practices, however, such homogeneity disappears, and a pattern of more ready receptivity to the newer techniques in the larger districts becomes apparent. Thus more than twice as high a percentage of the largest districts employ team teaching as compared with the smallest districts (see Table 2).

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[24] The sample data was projected to the national population in all districts of student population between 600 and 100,000 students. Unless otherwise stated, all figures are weighted projections to the national population.

While the data support some clear inferences, perhaps the "hardest" evidence that may be drawn from responses regarding new teaching practices can best be phrased and presented in negative terms. This is because the percentages in the positively expressed tables above hide variation in the extent of employment of particular practices. (For example, very few districts have any new programs in all grades in all schools.) Negative presentation, however, avoids problems of this kind. By showing the incidences of no report of the use of selected practices, we can estimate the proportion of the total student population of 33,731,000[26] enrolled in districts that did not employ a particular practice. At least this proportion of students, or more, do not have access to specific new programs. Indeed, the "true" percent will probably be somewhat higher because, as mentioned above, few districts have new programs in all grades in all schools, and therefore, some students excluded from the "no report" districts should in fact be included there. In sum, then, the overwhelming majority of students get no exposure to most of the newer teaching practices specified in the questionnaire. More than half of the 33,731,000 students included in our projection get no exposure to 13 of the 17 specified innovations (see Table 3).

In regard to the adoption of curriculum changes since 1965, the data suggest that the areas of most common innovation are science, mathematics, and reading. In each of these areas 40 percent more of the reporting districts, projected nationally, have engaged in at least some degree of curriculum change within the last two years. At the other extreme, only 8.5 percent and 11.9 percent of the districts have engaged in any kind of revisions of the fine arts and language arts curricula respectively.

Table 4 also illustrates the strong relationship between the size of the district and the adoption of curriculum reform. An interesting aspect of this relationship may be seen in these three curriculum areas, science, math, and reading in the very largest districts. In all three areas, and quite significantly in those of mathematics and reading, these districts

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[25] "Extensive" means that over 50% of the schools are affected. "Limited" means that less than 50% of the schools are affected.

[26] Total enrollment in the districts having from 600 to 100,000 students is 33,731,000.

Table 2

UTILIZATION OF NEW TEACHING PRACTICES AND EXTENT OF USE, BY DISTRICTS

District Size	N	Teacher Aides	Ability Class Groupings	Elem. Deptlzn.	Team Teaching	TV Instruction	El. Resource Teachers	Movable Partitions	Ind. Study	IPI	Programmed Instruction	Elim. of Letter Grades	Non-graded Sequencing	Gaming	Middle School	Variable Course Lngth.	Modular Scheduling	Extended School Year
25,000-99,999	(45)	73.3	64.4	66.7	66.7	62.2	66.7	53.3	42.2	37.8	37.8	33.3	66.7	28.9	17.8	26.4	35.6	8.9
12,000-24,999	(46)	84.8	69.6	60.9	73.9	56.5	69.6	65.2	50.0	45.7	50.0	43.5	58.7	32.6	17.4	37.0	37.0	6.5
6,000-11,999	(66)	75.2	63.6	53.0	62.1	47.0	40.9	42.4	40.9	30.3	28.8	22.7	40.9	25.8	12.1	12.1	15.2	7.6
3,000-5,999	(64)	73.4	73.4	62.5	62.5	46.9	46.9	50.0	40.6	21.9	34.4	39.1	31.2	23.3	14.1	18.7	20.3	1.6
1,200-2,999	(73)	61.6	61.6	55.8	21.9	28.8	26.0	26.0	30.1	24.7	19.2	23.3	15.1	17.8	17.8	15.1	6.8	5.5
600-1,199	(48)	72.9	54.2	60.4	27.1	35.4	20.8	14.6	14.6	25.0	22.9	14.6	12.5	4.2	10.4	2.1	8.3	6.2
Weighted National Projection		69.3	62.3	58.0	37.6	37.4	32.3	31.0	29.9	25.9	25.5	24.7	22.5	16.7	14.5	13.0	12.2	5.3
Extensive Use		53.5	44.9	36.4	19.7	31.1	26.7	13.9	17.8	16.0	15.5	20.3	9.6	9.0	5.7	8.7	5.9	2.9
Limited Use		12.9	14.3	20.7	17.5	4.1	4.3	15.4	10.6	7.8	7.7	3.5	12.1	6.7	7.6	3.5	5.3	1.2

NOTE: Figures by district are response figures, others are weighted national projections

TABLE 3

PER CENT NOT REPORTING USE OF SELECTED "NEW" TEACHING PRACTICES BY DISTRICT SIZE

District Size	N	Teacher Aides	Ability Class Groupings	Elem. Deptlzn.	Team Teaching	TV Instruction	El. Resource Teachers	Movable Partitions	Ind. Study	IPI	Programmed Instruction	Elim. of Letter Grades	Non-graded Sequencing	Gaming	Middle School	Variable Course Lngth.	Modular Scheduling	Extended School Year
25,000-99,999	(45)	26.7	35.6	33.3	33.3	37.8	33.3	46.7	57.8	62.2	62.2	66.7	33.3	71.1	82.2	75.6	64.4	91.1
12,000-24,999	(46)	15.2	30.4	39.1	26.1	43.5	30.4	34.8	50.0	54.3	50.0	56.5	41.3	67.4	82.6	63.0	63.0	93.5
6,000-11,999	(66)	25.8	36.4	47.0	37.9	53.0	59.1	57.6	59.1	69.7	71.2	77.3	59.1	74.2	87.9	87.9	84.8	92.4
3,000-5,999	(64)	26.6	26.6	37.5	37.5	53.1	53.1	50.0	59.4	78.1	65.6	60.9	68.8	76.7	85.9	81.3	79.7	98.4
1,200-2,999	(73)	38.4	38.4	45.2	78.1	71.2	74.0	74.0	69.9	75.3	80.8	76.7	84.9	82.2	82.2	84.9	93.2	94.5
600-1,199	(48)	27.1	45.8	39.6	72.9	64.6	79.2	85.4	85.4	75.0	77.1	85.4	87.5	95.8	89.6	97.9	91.7	93.8
Unweighted Total	(342)	27.5	35.4	40.9	49.1	53.3	56.7	59.1	63.7	70.2	69.0	71.1	64.6	78.1	85.1	82.5	81.0	94.5
Weighted Projection	(9088)	30.7	37.7	42.0	62.4	62.6	67.7	69.0	70.1	74.1	74.5	75.3	77.5	83.3	85.5	87.0	87.8	94.7
Student Projection	(33,731,000)	26.8	34.3	40.7	49.9	53.1	52.8	55.3	61.1	69.0	67.2	69.1	60.4	76.0	84.7	80.3	78.7	94.1

Table 4

REPORTED CURRICULUM CHANGE BY DISTRICTS

Curriculum Change In	25,000-99,999	12,000-24,999	6,000-11,999	3,000-5,999	1,200-2,999	600-1,199	Weighted National Projection	Extensive Use	Limited Use
Science	64.4	69.6	68.2	53.1	26.1	18.8	49.0	27.3	6.5
Mathematics	55.5	71.7	62.6	48.5	39.7	35.5	43.5	37.8	2.0
Reading	55.5	73.9	37.9	43.8	36.0	35.5	39.8	26.4	7.5
English	60.0	45.7	36.4	37.5	27.4	16.7	28.5	21.9	4.1
Social Studies	40.0	45.7	47.0	31.3	20.5	8.4	23.2	14.5	3.8
Foreign Language	40.0	43.5	34.9	26.6	10.9	16.7	19.6	15.5	2.5
Special Education	22.2	37.0	21.2	18.8	4.1	10.5	16.2	7.0	5.2
Language Arts	40.0	43.5	34.9	26.6	10.9	16.7	11.9	6.9	3.6
Fine Arts	11.1	8.7	4.6	14.1	6.9	6.3	8.5	6.2	.6

NOTE: Figures by district are response figures, others are weighted national projections show a considerably lower proportion of change than do the next largest districts in our sample. While the largest districts are still far more open to change than are the smallest two categories of districts, there does appear to be a fairly consistent drop-off in curriculum adoption and of the adoption of new teaching practices at the top population size in many of the areas covered by the study.

As in the previous analysis of data on the introduction of teaching practices, in the curriculum area, too, our most confident statements can be made about the absence of change; expressed negatively, then, it seems clear that in most subjects the great majority of the students in our projection of 33,731,000 are studying curricula that are unchanged since 1965; and that in the important fields of science, mathematics, and reading roughly half are using relatively old materials. In general, a lower percentage of students in the smaller districts have access to new curricula than in the larger districts (see Table 5).

Attitudes Toward and Sources of Knowledge About R&D

At the outset of our description of the survey of school superintendents, their lack of specific information about educational R&D was noted. But their responses couched in terms of broad areas of research yield useful insights into the knowledge and evaluations that the superintendents have of R&D. When identifying educational research that has important results for school practices, research in educational technology, organization of learning, and broad curriculum change were selected as having the greatest impact. Administrators of different size districts included the same three research areas at the top of their personal evaluation of R&D impact. What did differ among districts by size was the degree to which administrators from the larger districts were better able to supply responses and to refer to specific research projects (see Table 6).

Among the respondents to our survey, there was a strong degree of interest in research and development in education. When asked to express their intensity of agreement or disagreement with a series of 13 evaluative questions about R&D, the respondents took to their task conscientiously as evidenced by the low level of "no answer" responses appearing on Table 7. In essence, the respondents indicated their concern that research should be more oriented to development and application than to theory, and that more attention should be given to feedback and dissemination.

One section of the survey dealt with the sources of information which respondents utilized in keeping abreast of R&D activities. Word of mouth techniques were by far the most popular sources of knowledge, followed by "other professional journals." Research publications and bulletins were found to be least useful by a healthy margin. While there was some variation in patterns by district size (the larger tended to rely on publications more than smaller districts), the overwhelming impact of these findings is the preference for talking and listening rather than reading, and that in the choice of reading materials, ERIC and AERA publications ranked at the bottom of the R&D best seller list.

Table 5

PER CENT NOT REPORTING CURRICULUM CHANGES SINCE 1965 BY DISTRICT SIZE

District Size	N	Science	Math	Reading	English	Social Studies	Foreign Language	Special Educ.	Language Arts	Fine Arts
25,000-99,999	(45)	35.6	44.5	44.5	40.0	60.0	60.0	77.8	75.6	88.9
12,000-24,999	(46)	30.4	28.3	26.1	54.3	54.3	56.5	63.0	69.6	91.3
6,000-11,999	(66)	31.8	37.4	62.1	63.6	53.0	65.1	78.8	80.3	95.4
3,000-5,999	(64)	46.9	51.5	56.2	62.5	68.7	73.4	81.2	79.7	85.9
1,200 2,999	(73)	73.9	60.3	64.0	72.6	79.5	89.1	95.9	97.3	91.8
600-1,199	(48)	81.2	64.5	64.5	83.3	91.6	83.3	89.5	87.5	93.7
Unweighted Total	(342)	49.8	49.5	54.4	63.8	68.2	72.6	79.9	82.8	91.3
Weighted Projection	(9088)	51.0	56.5	60.2	71.5	76.8	80.4	83.8	88.1	91.5
Student Projection	(33,731,000)	46.4	52.4	52.4	60.8	65.0	70.2	80.4	81.3	91.2

Table 6

IMPORTANT RESULTS OF EDUCATIONAL R & D
(Weighted National Projections)

Type of Research	% Mentioning as Important
Research in Educational Technology	15.2
Research on Organization of Learning	13.8
New Curricula - basic areas	9.9
Research in Staffing	6.0
Research on Learning Process	4.3
New Curricula - other areas	3.8
SPECIFIC RESEARCH PROJECTS NAMED	3.1
Research on Early Childhood	2.4
Federal Research (Titles I, III, IV)	2.3
Research in Evaluation	1.9
General Curriculum Study	1.3
Other	6.6
NONE GIVEN	64.0

NOTE: Percents do not add to 100 as some respondents named several developments.

Table 7

RESPONSE TO OPINION STATEMENTS
(Weighted National Projections)

Opinion Statement	Strongly Agree	2	3	4	5	Strongly Disagree	No Answer
The primary focus of R & D should be on theoretical work as opposed to application.	1.0	1.5	9.4	12.9	22.8	46.9	5.6
When one looks at the overall budget for Educational Research and Development it is evident that more of the available funds should be allocated to development.	27.3	34.2	16.8	8.1	4.7	1.8	7.2
Dissemination is the most overlooked aspect of Research and Development.	25.5	34.2	20.2	9.7	1.6	3.8	5.0
A major Research and Development shortcoming is a lack of structure which would insure feedback of results.	20.9	38.2	18.1	12.3	3.4	0.7	6.4
Most researchers are more interested in refining their research than in seeing project results further on the road to implementation.	21.9	31.7	22.5	8.7	5.5	1.1	8.6

NOTE: The five statements eliciting greatest intensity of opinion

It should be noted, however, that the more detailed figures reveal interesting and generally encouraging results. While across all districts the number reporting extensive use of AERA publications and ERIC was 1.2 percent and 2 percent respectively, the data reporting some use of varying dissemination means indicate that both ERIC and particularly the regional laboratories are having a rather substantial impact, given the short period of time (three years from inception, two years of full-scale operation) they have been in existence (see Table 8).

In providing their assessments of what can be done to make the results of R&D more useful to themselves as consumers, respondents of all size districts agreed to a high degree that wider dissemination of R&D results would be the most helpful service that could be provided, with a desire for programs and models for implementation following closely in second place. Correlating with previously expressed preferences for sources of information were the third and fourth most frequently supplied suggestions for improvement, namely the use of workshops and the development of readable reports. Taken together with the low usage of R&D informational publications, the expressed desire for readable reports points to the unavailability of appropriately prepared and targeted materials, and suggests that the low use of written media for keeping abreast of developments is caused by the esoteric language used in most R&D reports.

While the consumers of educational R&D are dissatisfied in a number of ways with the products of research available to them, they are not conducting significant amounts of research themselves at the school district level. Nearly 60 percent of the national projection reports no research activities. However, of all the research activities being undertaken at the district level, the most frequently reported activity is that of curriculum development studies, and districts of every size category listed this research area most frequently. Approximately 20 percent of all districts in the weighted national projection are engaged in research on curriculum development. The only other area showing any significant district research activity is that of organizational change, with approximately 10 percent of the weighted national average.

In terms of the financial resources devoted to these activities, the median district expenditure comes out to $6,300, ranging from $63,800 as a median in the largest category of district to $1,550 as the median in the smallest district.

Summary

The evidence presented above permits the generation of several conclusions. The evidence clearly points to an impact of fundamental, conclusion-oriented inquiry on instruction and education. Evidence also exists for substantial impact in the case of some individual development efforts. Just as clear, however, is the suggestion that we have not yet been able to collect very good evidence on the impact of specific research and development activities on educational practice and that, where such evidence has been collected,

Table 8

Districts Reporting Some Use of Selected Sources of Information on R&D

(by District Size)

District Size	N	AERA	ERIC	NEA	REL's	Professional Journals	Professional Meetings	Workshops, Institutes
25,000 - 99,999	(45)	71.1	71.1	95.6	80.0	88.9	93.3	91.1
12,000 - 24,999	(46)	54.4	69.6	84.7	63.0	89.1	95.7	95.6
6,000 - 11,999	(66)	43.9	54.5	94.0	72.7	83.9	95.5	95.4
3,000 - 5,999	(64)	43.7	56.2	93.8	76.6	98.4	93.8	93.8
1,200 - 2,999	(73)	28.8	35.6	89.1	58.9	87.6	93.2	87.7
600 - 1,199	(48)	22.9	22.9	83.4	60.4	87.5	93.7	89.6
Unweighted Total	(342)	42.7	50.6	88.3	68.4	91.2	94.1	92.1
Unweighted Projection	(9088)	33.2	39.8	88.8	64.4	90.3	93.8	90.5

it has generally tended to demonstrate rather low levels of effect.

Several qualifications must be entered. Reports of use are not the same thing as actual use or actual use as intended.[27] A considerable variety of practices is embraced by such labels as team teaching or nongraded instruction. A second point of not inconsiderable importance is the degree to which specific innovations can in fact be traced to research (in the case of specific development projects like PSSC Physics or CHEM Study it is somewhat easier). More thinking needs to be done on these points before the precision of our conclusions about adoption and diffusion improves very much.

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[27] An example of this is pinpointed nicely in Table 3 where the weighted projection shows that 26 percent of 9,088 districts report some use of IPI (Individually Prescribed Instruction). Since Research for Better Schools reports that only 95 schools across the country have been authorized as field test centers for this innovation, it seems clear that the superintendents are reporting on individualizing _practices_ rather than IPI _per se_.

Chapter X

A REVIEW OF RECENT STUDIES OF POLICY AND PRACTICE

The present status of educational research and development in the United States is reflected in reports of recent research assessments. This chapter presents in synopsis form the substance of recent reviews directed or pertaining to the subject at hand.

Perhaps no index serves better to indicate the extent of the present interest in educational research than a simple count of the number of reviews of policy and practice which have been undertaken or whose results have been released in the past two years. They have ranged in form and scope from extended memoranda internal to the Federal Government to formally published studies. In all, ten such reviews have been identified.

Two of the studies have been conducted by committees of the Congress. Four have been or being conducted by groups internal to the Executive Branch of the Federal Government. Two have been sponsored by independent policy bodies, one by an individual, Francis Chase, under contract to the Department of Health, Education, and Welfare, and one by a nonprofit corporation using foundation funds.

Each of the studies has taken a somewhat different approach. The studies are distinguished from one another by the sponsors and the different aspects of educational research and development selected as concerns. Some have addressed themselves directly to the Bureau of Research, USOE, others to the entire field of educational research, and still others to the broad field of behavioral and social science policy.

Listed in chronological order of completion or issuance the ten studies directly related to educational research and development are:

- The Use of Social Research in Federal Domestic Programs, April, 1967
- Bureau of Research memorandum to the Bureau of the Budget, August, 1967
- Study of the U.S. Office of Education, December, 1967

- Report of the Committee on Economic Development, July, 1968
- Report of the Assistant Secretary for Planning and Evaluation, DHEW, October, 1968
- Discussions of the special panel of the Office of Science and Technology, begun October, 1968
- Francis Chase's report on the National Program of Educational Laboratories, December, 1968
- Report of the Research Committee of the National Academy of Education, May, 1969
- Report of the Assistant Commissioner for Planning and Evaluation, USOE, June, 1969
- Study of the education products industries, Institute for Educational Development (in progress)

In addition to all of the above, four studies bearing on educational research but not directly reviewing it have been undertaken, one by the American Educational Research Association, one by the National Academy of Science, one by the National Academy of Science/National Research Council and the Social Science Research Council, and one by Orville Brim for the National Science Board.

The chapter is presented in three sections. Reviews of the Bureau of Research, USOE, are presented first. A second section summarizes the studies of educational research and development in its full context. A third and final section briefly reviews the implications of the behavioral and social science studies for educational R&D.

Studies of the Bureau of Research, USOE

The Use of Social Research in Federal Domestic Programs

The first of the studies which have investigated the character and management of educational research and development programs was that conducted by the staff of the Research and Technical Programs Subcommittee of the Committee on Government Operations of the House of Representatives (Representative Henry S. Reuss, Chairman).

The principal questions to which the study was directed included:

> What was the scope and quality of social research financed by the Federal Government?
>
> Is social research now performed useful in the Federal program affected, and is it in fact used?
>
> Are waste and duplication avoided through administrative coordination and prompt dissemination of research findings?

> Is there adequate knowledge within Government of the limits and potentialities of social research resources which it can call upon in connection with Federal domestic programs?[1]

These questions were directed to all the social research programs of the government; educational research was covered in connection with the staff's study of the research programs of the Office of Education. The data associated with this part of the staff's larger effort are found in Part II of the published study and throughout Part III.

In summarizing the responses of social and behavioral scientists to inquiries by the Subcommittee Staff, Harold Orlans, consultant to the committee staff, concluded that the "kindest consensus" regarding the average quality of the educational research sponsored by the Office of Education was that it seemed to be "varied." Orlans assigned as the root cause for this, the "shortage of qualified social scientists -- psychologists, sociologists, economists, and anthropologists -- as distinct from 'educators'"[2]

Orlans was equally hard pressed to conclude what the social scientists' response as a group was to the question of the relevance of educational research to the major social problems confronting the Nation. Response was clearly varied on this item, too.[3]

Much of the debate which Orlans found implicit in the varied responses of the social and behavioral scientists who answered the committee's inquiries he attributed to the fundamental issue of the "degree to which educational scholars are and should be involved in reshaping local education..."[4] together with the confrontation between the academic and governmental worlds, the world of ideas and the world of action.[5] Orlans mentions critical unresolved questions in the identification of appropriate roles of universities, nonprofit research organizations, and the education industries. The transformation of some of the competition into effective and constructive collaboration will take, in Orlans' words, "an order of statesmanship not always in evidence."[6]

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[1] Henry S. Reuss, "Foreword," *The Use of Social Research in Federal Domestic Programs*, Part I. Washington, D.C.: U.S. Government Printing Office, 1967, p. iii.

[2] Harold Orlans, "Introduction," *The Adequacy and Usefulness of Federally Financed Research on Major National Social Problems, Part II of the Use of Social Research in Federal Domestic Programs*, *op. cit.*, p. 4.

[3] *Ibid.*, pp. 4-5.

[4] *Ibid.*, p. 5.

[5] *Ibid.*, p. 7.

[6] *Idem.*

Beneath some of the unearthed criticism directed at USOE's administration of research and development, Orlans found the objection of academic researchers to the new emphasis on larger, directed objectives.[7] But he also reported the comments of researchers who pointed to inadequate staffing in USOE, both in terms of numbers and quality.[8]

In summary, the Subcommittee's study provided a useful airing of many of the controversies which have eddied around educational research. The questions of research quality, the availability of manpower, the desirability of more involvement from the parent disciplines, the wisdom of greater direction from public agencies, and the tensions between basic research, educational development, and action/experimentation programs were teased out of the scholarly community and research program managers as a consequence of the staff's directed inquiries.

Special Study of Educational Research: August, 1967

In March, 1967, Charles Schultz, then director of the Bureau of the Budget, in connection with the budget process then on-going, requested that the Office of Education conduct a special study of educational research. The study would develop data on the major purposes for which funds were then being spent, changes in expenditure patterns over the preceding five years and expected over the next five, the institutional and discipline affiliations of those doing the research, extent of educational research in the Nation and the funding sources for it, and other similar questions relating generally to the field of educational research.

The response to Director Schultz' memo was prepared by a small task group using data then available to the Bureau of Research. A preliminary draft was reviewed by the Research Advisory Council of USOE and a revised version of the study transmitted to the Bureau of the Budget.

The study memorandum was divided into five principal parts. The first identified the central purposes of the Bureau of Research as (1) the generation of knowledge about learning and education, (2) the development of validated economically feasible alternative instructional products for adoption at local choice and initiative, and (3) the dissemination of information that will enable local schools to become aware of and implement new techniques. The broad scope of the responsibilities of the Bureau was identified, and the several functions (research, development, demonstration, dissemination, and training) were briefly enumerated.

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[7] *Ibid.*, p. 8.

[8] *Ibid.*, p. 7. The responses of the social scientists are reproduced in full in pages 108-151, Part II. Additional materials on the USOE research effort can be found in pages 152-249.

A second section, comprising approximately half of the memorandum, reviewed the status of the research program at that time. Allocations to selected research and development categories; project size; the Department of Health, Education, and Welfare planning-programming, budgeting categories; performing institutions; budget lines; and research functions were reviewed. The changes growing out of the then-recent amendments to the Cooperative Research Act were analyzed.

A brief review was provided of the research training programs administered by the Bureau. Estimates of the extent of research and the availability of resources for it in the Nation were developed.

In accordance with the instructions of the Secretary and the Commissioner of Education, a more detailed review of the regional educational laboratory program and examples of the types of activities being carried out under that program were provided.

Section three identified the policies which were being followed to move the research program from where it currently was in the direction of the program's objectives. Among those policies identified were (1) orientation of the major portion of the program toward a carefully focused research and development effort; (2) the increasingly explicit specification of the objectives of the research effort; and (3) the strong priority for fundamental studies or basic research to provide the basis for long-term improvement of instruction and education.

Acknowledging the relative newness of the concept of development in education, the study also identified several policies which were being pursued to strengthen and expand the capability for systematic, careful, and large-scale educational development as the means by which directed improvements in school practices and instructional procedures would be achieved. The first of these was the strengthening of the educational laboratories.

In addition to the support of programmatic work undertaken by research and development centers and laboratories the Bureau also stated its intention to support development through large-scale projects. Hope was expressed that this route would permit the utilization of capabilities for educational development already existing in private industry and non-profit corporations.

A third measure for strengthening development lay in the training authority created as a part of the new, more broadly defined responsibilities of the research program. The memorandum indicated the importance of continuing the kinds of research training programs initiated in fiscal year 1966 but gave additional stress to developing training programs to produce the new kinds of manpower required for educational development and diffusion.

The final policy stressed was the development of an active dissemination capability to complement the information storage and retrieval capabilities coming to fruition through the Educational Resources Information Center.

Two changes in the character and approach of the research program were identified as desirable. The first, not surprisingly, addressed itself to the need for a major, carefully planned, expansion of the dollar resources available for research in education. The major reason for this requirement was the substantial costs associated with educational development.

In discussing the requirement for a dramatic increase in the dollar investment for development, the memorandum referred to an earlier task force review of research conducted to identify legislative policy implications for future Federal aid programs. One of the major conclusions of that study was that development should focus its attention on entire schools or their equivalents; it grew out of the realization that the marginal impact of past research and development could be attributed to the fact that, because of low-scale funding, researchers had in the past been able to manipulate a relatively small number of variables for experimental or developmental purposes, but seldom could attack whole problem situations.

One significant consequence of carrying out the special study was the preparation of a policy paper for OECD by R. Louis Bright and Hendrik D. Gideonse,[9] the presentation of which led to the development of the present more detailed and documented study.

Study of the United States Office of Education

The next report to be issued bearing on educational research and development was that released by the Special Subcommittee on Education, Representative Edith Green, Chairman, in completion of their special analysis of the United States Office of Education.[10] Because much of the data in the report was collected on the programs and practices of USOE as they were in 1966, many of the recommendations and concerns raised by the Green subcommittee are no longer of great currency. Some of them still are, however. In any case, the review is an important landmark and as such deserves attention.

The recommendations of the subcommittee on the research responsibilities of the Office of Education can be grouped in several ways. A central concern lay in the need for clarifying the roles and responsibilities of the different instrumentalities for innovation. Considerable attention was directed to this problem and a quantity of data presented outlining its dimensions, particularly as it related to the research and development centers, the new regional educational laboratories, the new supplementary centers (also authorized by the Elementary and Secondary Education Act of 1965), and State and local educational agencies.

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[9] R. Louis Bright and Hendrik D. Gideonse, Education Research and Its Relation to Policy: An Analysis Based on the Experience of the United States, mimeographed, 48 pp. plus appendix, ERIC Document ED 018 866.

[10] Study of the United States Office of Education, 90th Congress, 1st Session, House Document No. 193, U.S. Government Printing Office; Washington, D.C., 1967.

The Green subcommittee also addressed itself to problems of internal coordination of research programs with operating programs. Among the recommendations on this problem were (1) that representatives of other operating Bureaus be involved systematically and regularly in all policy decisions affecting the allocation of funds for research and (2) that the research training programs be reconsidered with a view to placing administration of all training for educational personnel in one Bureau.

A third group of recommendations dealt with communications between the Bureau of Research and the education community. The report recommended much closer attention to the participation of State and local school personnel in advisory capacities, particularly "with a view of establishing better balance between higher education personnel and elementary and secondary education personnel."[11]

The passage of time has rendered some of the specific recommendations on USOE procedures moot; however, the general issue of coordination is still critically important.

HEW Review of Planning and Programs of the Bureau of Research, USOE

In response to a December 1, 1967, letter from the Director of the Bureau of Budget to the Secretary of Health, Education, and Welfare, a review of the Department's educational research and development activities was conducted by the Office of the Assistant Secretary for Planning and Evaluation, DHEW. The Director of the Bureau of the Budget had agreed with the HEW strategy that research and development was one of the most important Federal functions in education, and that appropriations, even in a tight budget year, should reflect this. Further study of the objectives and alternative strategies for educational research, it was thought, could lead to a more effective research program, and ultimately a much better educational system in the country.

Several staff members in the Office of the Assistant Secretary for Planning and Evaluation were detailed full time for a number of months to examine the planning, decision structures, and programs of the Bureau of Research. Key staff throughout the Bureau were interviewed, program files searched, and site visits held at research institutions across the country.

The report developed a range of data about the programs. Individual center and laboratory activities were identified. The workload of the Bureau was illustrated by several studies of project load and size.

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[11] *Ibid.*, p. 240.

The bulk of the report constituted an analysis and elaboration of the then-existing planning and decision-making processes of the Bureau. At the outset of their analysis the report acknowledged the complexity of such decision-making and identified four specific handicaps under which the Bureau was operating. First, educational research and development was seen as a relatively new field and the Bureau of Research identified as a relatively new organizational entity. Consequently, there were few precedents and predecessors on which effective planning and decision-making structures could be built. Second, the report acknowledged that the decision to manage educational research and development was even newer than the Bureau. Third, it recognized that educational research must relate to a pluralistic decision-making system which has not generally relied upon data from research and evaluation as a basis for adoption of new methods. And finally, the report noted that insufficient staffing severely limited the Bureau's capabilities for effective planning and decision-making.

The HEW report noted that the planning process of the Bureau of Research was in a state of quite rapid evolution, and it consequently directed its primary attention to the existing process with reference,as appropriate, to past practices. The report described the fragmentary and unstructured practices which had been followed prior to the beginning of 1968 and the attempt in the winter of 1968 to develop a more structured planning process. The report noted that the short period of time available for planning resulted in failure to integrate sufficiently the planning of the separate divisions within the Bureau. The absence of formal criteria for the selection of major development projects and the highly individualistic procedures which were employed in that decision-making process were briefly described.

Functions of the USOE Research Advisory Council were reviewed. The report noted that the Council was just beginning to fulfill its role as defined by its own functional statement. A major problem, although the report found it to be a decreasing one, was the Bureau's inability to provide the Council with concise issue papers and background materials so that members were properly briefed before their meetings.

Specific aspects of funding the research and development programs of the Office of Education were addressed. The allocation of Bureau funds to various target groups, particularly to the disadvantaged populations, was reviewed and the question raised about the relatively low allocation in comparison to the Department's education expenditures aimed specifically at improving education for the disadvantaged. Other aspects of the Bureau's programs reviewed included a major program effort relating to secondary education, the education research facilities program, the research training programs, levels of funding for unsolicited research, the small project program, and the Bureau's dissemination activities. In general, the critiques focused on the inadequate definition of the objectives of these several efforts and the difficulty of ascertaining whether those objectives were in fact being reached, were feasible, or significant.

The report offered a number of recommendations. Four recommendations were made with respect to the planning function. First, it proposed that a mechanism of some kind be designed for the purpose of gaining a thorough knowledge of ongoing research and development in education supported by private and public organizations throughout the country. Second, the need for developing procedures, an operating plan, and a timetable for the continuing and iterative planning cycle was identified. The report expressed hope that the procedures then being developed by the Bureau would be an important developmental step in that direction. Third, the importance of determining valid, achievable sub-objectives for research and development was stressed. Fourth, the provision of sufficient staff for the planning and programming function was urged.

The report also developed a number of recommendations on the use of advisory groups. It recommended that the composition and role of the Research Advisory Council be broadened and suggested that it might be Presidentially appointed and have a small permanent staff of its own. Also suggested was the appointment of advisory groups to each division of the Bureau to act in a consultative and advisory body to Division directors. An additional benefit of the participation of educators and researchers in the advisory groups identified above would be increased awareness in the field about policies, programs, and procedures of the Bureau.

Improved coordination between the Bureau of Research and other bureaus in the Office of Education was recommended as was the establishment of formal procedures for selecting major development projects. The HEW report identified as critically important the problem of defining the Bureau's proper role in focusing the research and development effort. In this connection, it reiterated the importance of clear and careful definition of objectives and the development of carefully considered, thoroughly coordinated, research and development attacks on major educational problems. The report stressed the need to devise ways to integrate the planning and programs of the educational laboratories (and by implication the research and development centers) with the remainder of the Bureau's programs.

The report recommended that the Bureau address its attention to the development of active dissemination and diffusion patterns in addition to the ERIC system. Research training and the research facilities program, it was felt, could benefit from further examination. Especially with respect to the training programs, the report recommended the support of studies to define requirements for educational research personnel and to develop more effective estimates of manpower than those currently available.

In summary, the HEW study directed its attention to the internal decision-making procedures of the Bureau and recommended greater systematization. Specific attention was given throughout the report to the importance of developing clear, concise, and relevant objectives for the various parts of the research and development program to insure focus on significant educational problems and provide important criteria for program accountability. Considerable attention was also directed to the development of more effective advisory structures, including the broadening of responsibility of the Research Advisory Council and a recommendation to develop advisory bodies for each of the operating Divisions in the Bureau. A third continuing theme in the report was the need for acquiring and utilizing an effective staffing capability for program planning and development.

The Chase Report on the National Program of Educational Laboratories

In late 1968, at the request of Commissioner Harold Howe II and Secretary John Gardner, Francis Chase, former Dean of the School of Education at the University of Chicago, undertook an overview of the National Program of Educational Laboratories. Dr. Chase spent half-time in the investigation of the 29 organizations (9 research and development centers and 20 regional educational laboratories) between the beginning of December, 1966, and the end of August, 1968. As background for his study Dr. Chase read the Gardner Task Force report which paved the way for establishment of the regional educational laboratories, the guidelines establishing the program, and reports of the initial program review conducted by a panel of researchers and educators under the chairmanship of Professor Laurence A. Cremin. The initial focus of the study was on the 20 regional educational laboratories, but it was later extended to the nine university research and development centers. All of the centers and laboratories were visited one or more times between December, 1966 and July, 1968. The chief purpose of the study was to provide some guidance for Federal policy respecting the laboratories and centers, but a secondary purpose which emerged as the study progressed was to help clarify the objectives of the laboratories and centers, reexamine the assumptions underlying their choice of activities, and delineate more precisely the intended effects and the means necessary to achieve these effects.[12]

Chase found that the concepts which led to the founding of the centers and labs were powerful but vague and that they incorporated differentiated, and not always mutually consistent, perceptions of roles and functions. Centers and labs, therefore, often had difficulty in defining their primary functions and identifying the particular expectations to which they could respond appropriately. In addition, he found that labs and centers often became aware that the knowledge base on which they were to work was weak and performance skills and technologies poorly developed. Furthermore, even while they were working their way through these problems, the early promise of ample funding for these new institutions became clouded, resulting in a new set of uncertainties. Nonetheless, Chase concluded that despite these considerable frustrations, the majority of the centers and laboratories have evolved into institutions with a promise of power for the improvement of education.[13]

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[12] Francis S. Chase, The National Program of Educational Laboratories: Report of a Study of Twenty Educational Laboratories and Nine University Research and Development Centers, December, 1968, p. 4.

[13] Ibid., p. 6

Chase reported that the labs and centers are functioning in ways which promise not merely to speed up the application of relevant knowledge and technology to education, but also to provide mechanisms and processes for continuing modification and refinement of programs, procedures and institutional settings. He found that within the past three years most of the centers and labs have achieved a sharper focus, better program delineation, and a closer integration of activities.[14]

He concluded that the centers and laboratories are demonstrating the possibility of systematic adaptation of knowledge and technology to educational use through a set of closely related processes ranging from the design of models and prototypes through the successive modification of materials, technologies, strategies, and systems for the achievement of specified effects.[15]

Chase found that the centers and laboratories are beginning to conceive research and development as a closely integrated system for producing specified changes in educational institutions and processes.[16] He found that a majority of the laboratories and centers have increased staff capability appreciably within the past two years but that few could yet be said to have capabilities adequate to the tasks involved in the accomplisment of their missions. One of the urgent needs which he identified was to increase staff capabilities by employing persons with abilities not well enough represented and by systematic programs to increase the capabilities of those employed.[17]

In reviewing the controversy which has centered on the question as to whether laboratories should be viewed essentially as institutions serving particular regions of the country or as parts of a national network of laboratories, Chase concluded that what in fact was happening was the development of a distributed national network of laboratories operating from a local or regional base but serving national purposes and producing national impact. He concluded that it is desirable to have one or more laboratories in the major regions of the country but that this did not mean that there was any special validity in the present regional grouping of laboratories.[18]

All of the laboratories conceive their functions in terms of development of tested products, operable systems, or other demonstrably useful contributions to the improvement of educational institutions and processes, but each laboratory has unique characteristics. He found three dominant kinds of orientation, including (1) product development, (2) regional development, and (3) orientation to a closely defined set of problems. Chase found the contribution of laboratories to be based on (1) the systematic development of ideas and technologies; (2) their progressive adaptation to each other as components of systems for the attainment of educational objectives; (3) careful calculations and tests of the educational gains from installation of the new components and systems and the cost of the gains; and (4) prompt communication to other educational agencies of the information essential to effective use.[19]

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[14] Ibid., p. 16.

[15] Ibid., p. 8.

[16] Ibid., p. 22.

[17] Ibid., p. 29.

[18] Ibid., pp. 34-37.

Addressing himself to the problem of the autonomy requisite for productive research and development, Chase found that it could be reconciled with accountability for the use of public funds only through the establishment of orderly and effective processes of review and evaluation. Chase recommended that once a center or laboratory has established its basic character and provided evidence of ability to plan, govern itself, and perform effectively the task to which it is committed, the frequency of formal on-site reviews might be reduced to intervals of three years.[20]

Chase identified four persistent problems which will continue to pose serious obstacles to effective research and development in education unless dealt with more decisively than in the past. Chase found that the approximately $30 million annually committed to the 29 centers and laboratories was "utterly inadequate for the support of anything approaching a major research and development operation in a field as complex as education, which in one way or another involves not merely the one-fourth of the population engaged in formal schooling, but in actual effect the total society."[21] Chase concluded that those who originally talked of annual expenditures of $100 million a year for the laboratories were, if anything, too modest in their estimates.

A second problem which Chase identified arises from the extreme dependence of the centers and laboratories on Federal funds. Careful attention must be directed to the interrelationships of governing boards, professional staff, advisory bodies, and USOE responsibilities in this regard.[22]

Chase also underlined the fact that the basic capital of ideas and empirically tested knowledge available for use in educational research and development is uncomfortably small.[23] The need exists, concludes Chase, to stimulate a variety of basic research on human ecology and human behaviors by generous research grants and increased support for the training of researchers interested in applying the methodologies of other disciplines to the study of education.[24]

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[19] Ibid., pp. 37, 38, 42.

[20] Ibid., pp. 42, 49.

[21] Ibid., p. 51.

[22] Ibid., pp. 55-60.

[23] Ibid., p. 60

[24] Ibid., p. 61.

Chase ended his report with five major conclusions:

- The national program of educational laboratories is evolving into a functioning system with demonstrated power and great potential for the improvement of American education.
- The modest investment in the laboratories and centers already has produced good returns and revealed possibilities for increasing the returns from all educational expenditures.
- The best way to realize continuing and enlarged gains from educational research and development is to conserve and build upon the strength that has been developed by the centers and laboratories which have shown that they can produce and which are making the greatest progress in improving their operation.
- Several matters require prompt attention in order to realize the full potential of center and laboratory types of organizations for contributions to innovation and to the necessary reconstruction and reform of educational institutions and practices.
- Successful research and development in education is and will continue to be both a science and an art, and qualitative assessments often are more relevant than quantitative measurements.[25]

Study by the USOE Office of Program Planning and Evaluation (OPPE)

Over the past eighteen months OPPE has conducted a review of the programs of the Bureau of Research. The stimulus for this study was identical to the one which led to the initiation of the Departmental review and report of October, 1968.

OPPE has not yet formally issued its report, but the central conclusions have been made available. OPPE found considerable controversy to exist over OE's research program. Generated by the fundamental conflict between those who are oriented toward theoretical approaches and "high-status individual scholars" and those who see the function of educational research as necessarily practical and action oriented, the issues are seen as further complicated by the absence of much support for the program from educational practitioners. Reflecting the concern in the field, the Bureau of the Budget occupies something of a contradictory position. Unhappiness over the relative absence of very many big names stands next to criticism that OE has not identified in explicit enough fashion the objectives the program is trying to achieve. These two postures are adopted without much awareness that luminaries do not seem to take very well to guidance according to stated purpose. Congressional mistrust, furthermore, is not assuaged by an active lobby group for educational research.

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[25] *Ibid.*, pp. 62-68.

The OPPE study is critical of the scale of the R&D efforts which have been mounted to date. Doubt is expressed that the problem focus of the research and development centers will work out well in the long run, and reservations are expressed that a number of centers have been unable to attract outstanding senior personnel. The report concludes (1) the centers have not succeeded in mobilizing a broad interdisciplinary base to tackle important educational problems, (2) most but not all have been relatively unsuccessful in attracting strong staffs, yet (3) generally they are adequately staffed and do relatively respectable work.

OPPE finds the regional educational laboratories spread too thin and recommends that the number should be reduced to no more than eight or ten. Projects being supported by the laboratories are criticized on the grounds that many evince a lack of theoretical grounding and many are being subjected to inadequate evaluation treatments. On the other hand, OPPE finds the development of these new institutions to be extremely interesting and, by implication, potentially important contributors to research and development and education.

The research training programs of the Bureau of Research are found to be wanting in that there is (1) an over-emphasis on education in contrast to the academic disciplines other than psychology, (2) an excess of older trainees, (3) an acceptance of too many trainees who have interrupted their studies for one reason or another, and (4) insufficient attention to the long-range manpower requirements, especially in the direction of training development specialists and dissemination and diffusion experts. OPPE recommends (1) that in the future the training program should select from a broader range of first-degree recipients than education and psychology, (2) that even if the concentration in those areas holds, the training should be done outside of schools and departments of education, (3) that research training programs should be concentrated where there is research being performed, and (4) that some emphasis should be placed on the training of research administrators.

OPPE's examination of ERIC led them to conclude that the outputs of many of the clearinghouses were uneven and that the selection of topical areas for clearinghouses was difficult to rationalize. They recommended that immediate attention be directed (1) to realigning the clearinghouses, (2) to an evaluation of the effectiveness of the microfiche technology, (3) to building linkage mechanisms with state and local education agencies, and (4) to developing some technique for citing the quality of the documents contained in the central depository.

In its concluding recommendations OPPE attributed the ebb and flow in research emphasis characterizing the programs of the Bureau of Research to the Bureau's inability to set itself consistent goals, its inability to structure the goals in terms that were meaningful to educational researchers, and its failure to enlist the cooperation of the relevant research community in developing its program. While it found the development of a number of taxonomies for describing the programs of the Bureau useful analytical devices, more important in OPPE's opinion was distinguishing what was of most worth rather than how much of it the Bureau was supporting.

Strongest emphasis was attached to developing a set of mutually exclusive research and development goals which would permit the Bureau to establish a consistent set of objectives in close cooperation with the research community. OPPE recommended a radical restructuring of the Bureau of Research into a National Institute of Education which would merge researchers and research administrators into an organization whose charter would be to reach and serve a mutually agreed set of research and development objectives.

Reviews Extending Beyond USOE

The six reviews described so far concentrated explicitly on the Bureau of Research, USOE. The next four directed their attention to one or another aspect of the entire field of educational research and development going well beyond exclusive attention to USOE programs.

A Report by the Committee for Economic Development

Less than a year after the USOE Bureau of Research's special study had been submitted to the Bureau of the Budget, the Committee for Economic Development, a private non-profit corporation, whose members are 200 leaders of American business, industry, information media and educational enterprises, issued a major policy report, Innovation in Education: New Directions for the American School.[26]

The significance of this statement is underscored by the membership of the committee and the procedures that are followed when a report such as this is issued. Members generally hold the office of Chairman of the Board, President, Vice-President, or General Counsel of their respective organizations. Examples of the enterprises whose officers are individual members of CED are: General Motors Corporation, General Electric, Equitable Life Insurance Company, Coca-Cola Company, United Fruit Company, Newsweek Magazine, and Time Incorporated.

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[26] Innovation in Education: New Directions for the American School, Committee for Economic Development, July, 1968.

The Research and Policy Committee of CED, consisting of 50 of the 200 members of the organization, is empowered to initiate "studies into the principles of business policy and of public policy which will foster the full contribution by industry and commerce to the attainment and maintenance of high and secure standards of living for people in all walks of life through maximum employment and high productivity in the domestic economy." They are charged to see to that all research is "thoroughly objective in character, and (that) the approach in each instance is to be from the standpoint of the general welfare and not from that of any special political or economic group."[27] Innovation in Education is one of a series of periodic statements on national policy which are preceded by discussions, meetings, and exchange memoranda. The national policy statements which eventuate from the research process are debated and formally voted upon by the Research and Policy Committee before publication.

In the development of this report the committee relied heavily upon a number of commissioned papers prepared by experts in the several areas covered by the report.[28]

The CED report focuses upon the improvement of education through the 12th grade level. CED adopted this focus because it comprises the largest segment of formal education and because that segment assertedly presents the greatest challenge in the Nation. A range of issues are discussed, including educational research and development, educational technology, the basis for compensation of teachers, the development of specialized teaching occupations, and the applicability of cost benefit analysis in education.

The findings of the CED report may be grouped under three propositions:

- The present organization of education is behind the times and is inappropriate to changing societal values and available technology.
- The promise of educational improvement which enhanced instructional techniques hold cannot be achieved at the present rate of expenditures for research and development in education.
- Modern techniques of program planning and evaluation and cost benefit analysis can profitably be applied to education (with due regard for important limitations). Typically, such techniques are presently very little utilized.

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[27] Ibid., p. 4.

[28] The papers were published separately in The Schools and the Challenge of Innovation, Supplementary Paper No. 28, Committee for Economic Development, January, 1969.

In the eyes of the committee, American education is maladjusted to the world of the future in several generic ways. The schools too often educate according to the values of the past, focusing upon the irrelevant prejudices of an older generation accustomed to accept as natural the regimen of lecturing, the primacy of facts over values, the omnicompetence of the teacher, the presumed superiority of the printed word as learning medium, and so on. New instructional techniques are too slowly developed and adopted and generally under-funded. The Committee recognized the most serious failures in American education were produced by the large failures of American society. But there could be little doubt that poverty, cultural deprivation and the effects of racism and segregation continue to block academic progress in many areas and many schools.[29]

The report endorses a new mix of instructional techniques. "In the new view teaching and learning activities in the schools can be classified under three categories: (1) lecturing, explaining, and demonstrating; (2) independent study and inquiry under supervision; and (3) discussion involving the teacher with small groups of students."[30] The report rejects the notion that educational progress is tied to pupil-teacher ratios. Indeed a chief fear of the report is that increments of funds which become available for education will be lost on across-the-board raises to teachers and salaries for an army of new teachers in pursuit of small and indiscriminate - though costly - reductions in class size.[31]

CED is "convinced that a most pervasive problem in American schooling is the need for improving instructional techniques and processes. In any national effort to improve our schools the decision-makers at all levels of education, and the public as well, must give immediate attention to the principles and methods of teaching and learning."[32] The Committee favorably anticipates the potential contribution of educational technology in strengthening instruction. They conclude that past experience with such technology is of little value in estimating its possibilities. They express the conviction that teaching technologies have been introduced so haphazardly and have operated so intermittently that reliable inferences cannot be drawn to permit their evaluation.[33]

Indeed, the utilization of educational technology is judged to be still in its infancy.[34] The impact of Federal programs, however, for curriculum development is evaluated as beneficial and a continuation of such programs is urged.[35]

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[29] Ibid., pp. 11-12.

[30] Ibid., p. 40

[31] Ibid., p. 28.

[32] Ibid., p. 11.

[33] Ibid., p. 63.

[34] Ibid., p. 10.

[35] Ibid., p. 16.

A major theme of the CED report is the conviction that the road to educational improvement lies through increasing the productivity of the individual teacher, and not through mechanical reductions of the pupil-teacher ratio. They believe that "the means are now available through the various techniques that we have suggested: e.g., the reorganization of instruction, the redesign of curricula, improved and new audio-visual methods, and the improvement of teacher education."[36]

Granted that new instructional materials and processes can open the way to a higher plane of educational effectiveness, what steps did the committee think must be taken to engineer such materials and processes? "The missing link in education is development research as it is practiced in industry."[37] The Committee points to the gaping disparity between the percentage of industrial expenditures devoted to developmental research compared to educational expenditures for development. According to the CED figures, industry R&D funds are allocated approximately 4.2 percent to basic research, 18.8 percent to applied research, and 77 percent to development. By contrast only 10 to 12 percent of educational R&D funds are allocated in the committee's eyes to development.[38] The CED report finds that the total funds expended in the U.S. on educational R&D is a small fraction of one percent of the total investment. Industry on the other hand is found to spend from 3.4 to 5 percent of gross revenues on R&D, a ratio favoring industry over education by a range of 7 or 10 to one.[39]

From its findings the CED study concluded that there are "four imperatives for the schools:"

- The American school must be better organized for innovation and change.
- There must be an increasing emphasis on both basic and applied educational research and on the dissemination and practical application of that research. The useful and effective must be distinguished from the non-productive and wasteful through developmental studies employing research findings.
- School systems must employ continuously the results of cost benefit and cost effectiveness analyses in order to allocate effectively the resources available to education and to distinguish among programs of high and low priority.

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[36] Ibid., p. 18.

[37] Ibid., p. 30.

[38] Idem.

[39] Ibid., p. 29.

> - There should be established a National Commission on Research, Innovation, and Evaluation in education to encourage itensified and widespread research, development, and evaluation bearing on all aspects of education as a means to more effective methods of instruction.[40]

The proposed national commission constitutes the leading recommendation of the report. The commission must meet three criteria: (1) independence of both the educational bureaucracy and the government; (2) prestige and influence which calls for members' competence and distinction; (3) effectiveness, which means that it must command talent of a high order and be capable of acquiring the funds necessary to its work.[41] CED recommended that the commission be established by direct charter of the Congress as an independent, non-governmental agency, empowered to receive both public and private funds. Commission members should be broadly representative of the major segments of the society and should comprise persons of unquestioned stature as educational statesmen. The activities of the commission would encompass the entire range of research, development of innovations, and testing and evaluation of educational products and processes.[42]

To support the recommendation for reorganization of American school systems to foster innovation, CED urged that each school system have a special innovation staff which can assist in translating research and development into educational practice.[43] Teachers who originate or creatively apply innovation should receive special awards.[44] Further, to stimulate research and innovation across the Nation, special centers are proposed with working relations with experimental schools and teacher education institutions.[45]

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[40] Ibid., p. 13.

[41] Ibid., pp. 69-70.

[42] A memorandum of reservation was issued by Elvis J. Stahr to the effect that further consideration should precede the establishment of the national commission. "The functions specified for the commission are, at the same time, too general and too specific. They are too general in the sense that they encompass the full range of functions assigned presently to the Bureau of Research in the U.S. Office of Education without specifying how they could be better accomplished using the vehicle proposed. They are too specific in mentioning certain tactics, e.g. demonstration schools, which have been tried often in the past (as recently as ESEA - 1965) and found wanting." (Ibid., p. 73).

[43] Ibid., p. 31.

[44] Ibid., p. 62.

[45] Ibid., p. 17.

Task Group on Educational Research and Development - President's Science Advisory Committee

The President's Science Advisory Committee is the principal science advisory body to the President of the United States. Since the late 1950's the Committee has expressed its interest in educational research and development. First, the Panel on Science and Engineering Education, chaired by Lee Dubridge (now President Nixon's Science Adviser), worked in this field, and in 1959 the PSAC statement "Education for the Age of Science" was issued. In late 1961, the Panel on Educational Research and Development, chaired by Jerrold Zacharias, was established.[46] In recent months, a new Task Group on Educational Research and Development, chaired by Frank Westheimer, was established. Operating under a broad charge from PSAC, this new ten-man group has been engaged in studies, meetings, site visits and discussions with researchers, developers, educational policy makers, and government officials. Its purpose is to help determine how PSAC might help the nation move toward a better system of educational research and development.

From time to time the Task Group has communicated its concerns to various government officials; no formal reports have been prepared. Nonetheless, the significance of this review and study grows out of the closeness of PSAC and the Office of Science and Technology to the inner policy councils of the Executive Office of the President.

The Task Group and a subsequent newly constituted PSAC Panel on Educational Research and Development have been especially concerned with the following pressing needs:

> Increased basic research in education of the sort being fostered by the National Academy of Education - National Research Council Committee on Basic Research in Education.
>
> Broader involvement of the various intellectual communities (including school people, persons from schools of education, social, behavioral, and natural scientists, humanists, artists and persons from other professions) in the carrying out of educational research and development and in evaluation of projects and proposals.
>
> Greatly increased research and development in early child development to increase our knowledge in such areas as the nature of the child, how he learns to walk and talk, what interventions in his learning are appropriate and useful at what stage in his development and in what setting.
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> A program of experimental schools which will allow careful development and assessment of alternative models of education such as the

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[46] Of considerable interest is their progress report, Innovation and Experiment in Education, Panel on Educational Research and Development, President's Science Advisory Committee, March, 1964.

new freer English schools with an abundance of materials in the classroom, schools with a strong admixture of working experience, greater use of non-school settings for education, elementary schools with substantial numbers of male teachers, schools with minimal basic requirements but opportunity and encouragement to learn more. A program of experimental schools has been proposed to Congress by HEW in the FY 70 budget.

Helping put education on a more scientific basis by developing new ways of evaluating educational programs (as opposed to determining relative performance of individual students). Greater emphasis should be placed on broader educational goals such as the ability to analyze a new situation into manageable problems, continuing interest and initiative in learning, and long term retention of skills and knowledge. In addition, tests of individual students should be changed in these directions as a way of influencing educational programs, which are now controlled to some extent by tests that students must take.

The Report of the Committee on Educational Research of the National Academy of Education

The National Academy of Education (NAE) was founded in 1965 under charter from the Board of Regents of the State of New York, "to promote scholarly inquiry and discussion concerning the ends and means of education, in all its forms, in the United States and abroad." The Academy serves as a forum for conversation, debate, and mutual instruction, for the communication of accurate information and informed opinion, and for the stimulation of research.

The report of the NAE's Committee on Educational Research, Research for Tomorrow's Schools: Disciplined Inquiry for Education, has just been published.[47] In this volume the Academy has developed a report aimed at helping the educational community make effective use of research and scholarship.

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[47] Lee J. Cronbach and Patrick Suppes, editors. New York: The Macmillan Company, 1969.

The research committee interpreted its charge broadly; they did not restrict themselves to the conventional areas of educational research but ranged over all inquiry and reflective analysis relevant to education. Briefly reviewing the reports prepared over the past decade on educational research, the NAE study notes the agreement "that massive, lasting changes in education cannot safely be made except on the basis of deep objective inquiry."[48] It is this concern to which the report addresses its attention. A strong historical flavor was adopted in order to place current policy decisions in the long perspective. Recognizing the extremely difficult nature of inquiry into educational matters, they addressed particular concern to the impediments to excellence in educational research. Several chapters in the report discuss the history of American educational research and the evolution of educational thought and practice from various significant lines of inquiry. But the major focus of the report is on the adumbration and explanation of what constitutes disciplined inquiry and its two sub-sets (conclusion-oriented and decision-oriented research), and the specific analysis of existing forms of research management with recommendations for improvement.

The report addresses a number of questions relating to the improvement of the research effort. Some concern is expressed about the small portion of the USOE budget which is devoted to research and research training, and, within that, even greater concern is expressed about the proportion of dissemination and "undisciplined innovative activities" which, in the committee's eyes share greatly in the research budget.[49] After examining the extent of the resources available for research and development, the report concludes that there is much less disciplined inquiry than there should be. The report concludes further that funds are not the only problem; the supply of trained investigators is also too limited.[50]

The report addresses its attention to the manpower problems for educational research and development. It expresses considerable concern about the status of current training programs for research in education and the inadequate supply of persons already trained for inquiry in education. It recommends that the training of educational researchers should not be the undivided responsibility of schools of education. Identified as features likely to characterize superior programs of training for research in education are:

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[48] *Ibid*., p. 12.

[49] *Ibid*., p. 203.

[50] *Ibid*., p. 206.

- Full-time study for three consecutive years, preferably at an early age
- Training as part of a student group individually and collectively dedicated to research centers
- Participation in research at steadily advancing levels of responsibility beginning in the first year of graduate school
- A thorough grounding in at least one academic discipline and the technical skills that discipline employs
- Study of the educational process and educational institution, including the social goals of education, the bases for policy decisions, the historical development of curriculum, the nature of the learner, and other factors.[51]

The report is critical of university practices which place a premium on early results thereby reducing the readiness of young investigators to embark on long term, uncertain investigations.[52]

The report finds the effect of the large scale influx of funds in recent years has been to divert senior people from actually engaging in thinking, writing, researching, and training. It recognizes, however, the importance and significance of questions pertaining to research management and proposes that they be subjected to much more extensive consideration. Critical of misplaced values in the academic community, the report recommends more attention to longer range consideration and less to the getting of grants as achievements in themselves.

Attention is directed to the importance of developing "commerce" between the education faculty and other faculties of the university on a regular and continuing basis.[53] The need to toughen publications standards as a basis for improving research quality is suggested. Some attention is paid to the special problems of research bureaus and research and development centers, although the picture is still too unsettled in the committee's eyes for sensible evaluation of operations barely five years old. The concluding portion of the last chapter is directed to a discussion on the funding of educational research. Commenting that funding agencies are swayed by political realities in the pressure to disperse funds geographically, the report nonetheless emphasizes that there is a need for a concentration of talent to support sound research, development, and training enterprises. But the committee is firm in its belief that there are not enough excellent persons available to sustain the recent pace of a dozen new centers each year.

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[51] Ibid., pp. 212-213.

[52] Ibid., pp. 225-226.

[53] Ibid., p. 231.

In the report's eyes, the central problem for Federal funding agencies is to make sure that the work they support is of high quality. And these kinds of judgments are heavily dependent upon the quality of the people, either as panels or staff reviewers.

Directing their attention to the relations between the USOE and the community of investigators, the committee notes that they have frequently been unhappy.[54] The subtle effect of the greater willingness to apply to other mission-oriented agencies than the Office of Education is to shape the thinking of investigators away from the problems of education. The report reviews USOE's unfortunate reputation as indicated by researchers' responses compiled for the House of Representatives Committee on Government Operations report, The Use of Social Research in Federal Domestic Programs.

In particular, serious questions were raised about the direction of USOE programs and the administrative procedures that were followed. Two aspects of criticism to which the report pays special attention are the problems of staffing OE and the rate at which the Office of Education has been flooded with new responsibilities. The committee recognized, however, that this was not peculiar to research operations there, but rather was endemic to the entire USOE operation.

The report was specifically critical of the allocation of research funds made by the USOE.[55] Panels when used were sometimes overloaded. In other instances, the social significance of potential contribution in the staff's eyes tended to overrun panel reservations regarding the quality of proposed work. In the judgment of the committee, staff members involved in the review process have generally been in poor communication with the academic sector. The report is also critical of Congressional pressures on the allocation of research funds, and also made suggestions that for larger responsibility in the review of research proposals be assigned to consultants from elementary and secondary education. Furthermore, the committee finds an additional over-emphasis on immediacy in the Congressional concern that research projects to which funds are allocated do not seem to be in a one-to-one correspondence with the action programs of USOE. Instead, it is recommended that positive efforts be made to identify problem areas that are still below the horizon of legislation and appropriations for action, rather than for an allocation policy that instructs research workers to, in the committee's words, "bring up the rear after the action starts."[56]

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[54] Ibid., p. 242.

[55] Ibid., pp. 249-250.

[56] Ibid., p. 250.

The report does give credit to the Bureau of Research for identifying problem areas that are outside of current fashion, but cautions against too much direction of the research effort and in favor of joint leadership.

In the committee's eyes perhaps the most important recommendation they could make to the USOE was to find better channels for frank communication with the scholarly community. Communications need to be made more open and USOE staff have to establish much more colleague-like relations with the field.

A Study of the Education Products Industries

A last review of educational research and development, not completed but of considerable interest, is the study undertaken by the Institute for Educational Development (IED), under the direction of Dr. Nancy A. Bord of research and development in the education products industries. Preliminary findings have been made available and are used with the permission of Dr. Bord and IED.

IED found that there was no monolithic pattern or uniform set of practices characterizing research and development in the educational materials industries. Interestingly enough, regardless of the kinds of materials he makes, or of his own R&D practices, the producer of educational products tends to think of the defense-aerospace model as representing "genuine" research and development. Despite the clarity of this model in their minds, however, the materials producers have great difficulty in defining what constitutes research and development within their own industry.

IED found that most of what constitutes research and development in the educational materials industries was either formal or informal market research. Publishers' concepts of what constituted research and development varied with the type of book, the nature of the organization, and sometimes with the course or subject. College books received the least research and development effort, test and reference books the most.

The most important factors affecting non-book materials producers were whether they were independent corporations or subsidiaries and, in the latter case, what kind of company their parent company is.

Major corporations have generally not transferred parent models and styles of research and development to acquired subsidiaries. Divisions formed within major corporation, however, are more likely to follow parent company patterns.

IED found that, with very few exceptions, company officials' perceptions of their role in the educational enterprise were quite limited and relatively passive. IED concluded that restricted and passive role perceptions appeared to limit the possibilities for research and development activities within the educational materials industries.

Two Relevant Addresses

While technically not reviews of educational research in the sense of the four studies identified above, two recent addresses are worth briefly summarizing here. Each provides a perspective for educational research and development which is not fully represented in the reviews summarized in the first two major sections of this chapter.

The first address was delivered by Associate Commissioner for Research (USOE) Norman J. Boyan in February, 1969, at the annual meeting of the American Educational Research Association (AERA).[57] Addressing himself to the relationship between educational research and educational policy, Boyan noted that individual R&D efforts rarely ever achieve "breakthrough" status, that generally it is long lines of inquiry that produce significant impact. Furthermore, underscoring that more than research was required, Boyan stressed the importance of development.

Boyan's central point, however, was that policy-making in educational research is a specialized problem of science policy in the larger sense. Not only is there a politics of education and a politics of science but there is a politics of educational research and development. "It is crucial," he said, "for the educational research community to construct a more powerful apparatus for affecting policy on educational research."

Noting the importance of attending to the goal of educational research - the improvement of educational practice - Boyan pointed to the necessity of selling research in terms of the results expected of it, not in terms of the means for performing it. He stressed that the orientation of the Bureau of Research to the solution of high priority problems was a matter of survival, but that its success in this regard would require the assistance of the research community through their acceptance of a continuing commitment to the improvement of educational practice and their mastering of a fuller understanding and more expert practice of the politics of educational research.

The second address was also delivered at the February, 1969, meeting of AERA. Outgoing President David Krathwohl talked on perspectives and prognosis for educational research.[58] Comparing the national investment of 3 percent in research and development to the 2/10 of 1 percent (sic - this study has shown that it is probably closer to 4/10 of 1 percent but Krathwohl's point is still valid!) and noting that 3/4 of the funds ever made available for educational research and development have been obligated in the past three years, Krathwohl rehearsed the three principal criticisms of educational R&D. First, it is judged to be not practical or relevant enough. Second, it is too little integrated horizontally across the educational research community. Third, there is substantive fragmentation of the research projects themselves.

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[57] Norman J. Boyan, Educational Research and Educational Policy, invited address, AERA Annual Convention, February, 1969.

[58] David R. Krathwohl, Educational Research: Perspectives, Prognosis and Proposal, Presidential Address, AERA Annual Convention, February, 1969.

Krathwohl finds that educational research and development suffers from too little "vertical" integration of the whole complex of researchers, developers, State educational agencies, superintendents, principals, teachers, and students. The lack of vertical integration makes adoption and installation more difficult.

Directing his attention to the problem of fragmentation in educational research, he noted that studies are often unrelated to one another and unrelated to theory. He cited the need for greater integration within educational research and between educational research and the social and behavioral sciences. Krathwohl, too, saw the road to progress in the ability of educational research to focus on problem oriented target areas.

In the latter part of his address Krathwohl proposed the development of a National Institutes of Education separate from the Office of Education and, like the National Institutes of Health, responsible to the Department of Health, Education, and Welfare. The functions of the present Bureau of Research would be absorbed by the new entity. Krathwohl described a central coordinating staff which would, like NIH, work with a series of institutes focused on critical education problems. Advantages of the proposal were seen to be in the stability of effort that could be achieved, the achievement of vertical integration through participation on advisory bodies, and, that being one step removed from political pressures, it would finally be possible to solve the priorities problem. Krathwohl explored other advantages and disadvantages and ended by concluding that the Institutes idea would give a bold new thrust to educational R&D.

Four Additional Relevant Surveys

In addition to the ten studies and reviews identified thus far, four other activities of a slightly different character from the preceding ten (one is completed, three are still underway or nearing completion) are of considerable importance to the field of educational research and development.

Social and Communication Mechanisms in Educational Research

The first of these, sponsored by the American Educational Research Association and supported in part by the USOE, is a series of studies and meetings designed to lead toward (1) "a more explicit conceptual framework of how the field of educational research is operating, and

(2) the development of new mechanisms that will enable educational researchers to better exchange and evaluate scientific information and knowledge and otherwise allocate resources and develop priorities."[59]

The AERA effort is divided into five pieces. The first is a study of the "more typical communication channels" in educational research. This piece is being conducted by the Center for Research in Scientific Communication at the Johns Hopkins University. Four sub-studies are a part of this work. They include studies of (1) the annual meeting of AERA, (2) the fate of materials presented at the annual meeting, (3) the production of current journal articles, and (4) the way researchers use the major journals in the field of educational research. The studies are designed to provide extensive baseline data about the way scientific information is exchanged in educational research for the purpose of improving the interaction among researchers and between researchers and practitioners.

The second part of the larger AERA effort will be a replication in the field of educational research of a completed study of invisible colleges of psychologists classified as attitude researchers. Invisible colleges in educational research will be identified and interviews conducted to determine the way members communicate with each other, particularly those in different disciplines. It should provide clues on how the leadership of colleges influence what other researchers study and the methodologies they use, and on the relationship between invisible college membership and individual productivity.

The third part of the larger study will approach the workings of the field from the concepts of institutionalization of research findings. Attempts will be made to identify critical weaknesses in the institutionalization processes, with particular focus on how the social systems operate in educational research.

A fourth part of the effort involved holding a two-day meeting in the fall of 1968 (1) to receive preliminary findings on each of the three studies identified above, (2) to bring together key leaders in educational research to pinpoint critical problems along the dimensions of communication research and research in the institutionalization of research, and (3) to orient AERA officials to ideas which could be used in the drafting of recommendations for new programs for the AERA.

The fifth part of the AERA effort is to make use of the findings of the study and ideas developed in the colloquium in connection with a long-range planning committee which will draft specific recommendations for new policies and activities for action by the AERA council.

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[59] A Proposal to Improve the Social and Communication Mechanisms in Educational Research, AERA, Office of Education, Grant Number OEG-0-8-080751-4432, p. 5.

Preliminary findings on some of these efforts have been released. For example, from initiation of work to general publication in education seems to be a long process, involving, on the average, three years. Producers seem to go to a considerable amount of effort to disseminate the research findings, but in most cases they fail to reach genuinely public audiences.[60] Furthermore, Garvey reported that few persons at the annual meeting of AERA had had prior acquaintance with work encountered there and that the meeting therefore constituted the first public announcement of the vast majority of presentation material. The meeting presentation tended to be an interim report of relatively recent work which, at the time of the meeting, was already being prepared for general publication. The meeting exposed attendants and requestors to a large body of educational research of which they might otherwise have remained unaware for a year or two longer. There was, therefore, intensive information exchange with authors at the meeting. The exchange primarily involved efforts to locate new sources of information and to establish new informal networks.[61]

Examination of journal publication as an instance of the dissemination process reveals that from the time an educational researcher starts his work until that work becomes integrated into a scholarly subject matter review, the dissemination process is long and arduous.[62] Differences between the communication system in educational research and in other research areas reveals that the percentage of attendants at the annual meeting in education research who prior to hearing the presentation had had any acquaintance with the content was abnormally low compared with other groups (e.g. American Sociological Association, Association of American Geographers, American Meterological Society, etc.). A second significant difference is that an educational researcher must examine 18 different journals in order to read half the material presented at the annual meeting. Compared to most other groups, AERA seems extraordinarily diffused in its range of publication vehicles.[63]

Through the series of activities described above, AERA hopes to be able to become much more conscious of communication processes in its own field and, as a result, become more likely to achieve better horizontal and vertical integration within the field.

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[60] William D. Garvey, Carnot Nelson, and Nan Lin, "A Preliminary Description of Science Information Exchange in Educational Research," mimeographed, p. 5.

[61] Ibid., pp. 8-9.

[62] Ibid., p. 13

[63] Ibid., p. 17.

The Report of the National Academy of Sciences (NAS)

While not directly bearing on educational research and development, the recent report of the NAS, The Behavioral Sciences and the Federal Government, merits reference as further indication of the increasing interest and activity in the utilization of the behavioral and social sciences in support of governmental missions. Education, of course, is one of the missions for which such concern is appropriate as the report itself acknowledges.

The report was initiated in 1965 to investigate the general posture of the behavioral sciences in Federal government planning and policy, but shortly thereafter, the "Camelot affair" added special urgency to the task and stimulated somewhat closer attention to the problem of social research in foreign countries.[64] The report focuses particularly on the role which the National Science Foundation and the Office of Science and Technology in the Executive Office of the President have played in science policy in relation to the behavioral and social sciences. It discusses policy requisites for useful incorporation of behavioral science perspectives in government planning and programming.

The report found that, though the formulations of the behavioral and social sciences are less exact than those in the natural and physical sciences, the need for the former in government planning is very great. The present economic and statistical advisory systems established in the Federal government are commended as examples of the well integrated uses of behavioral sciences.[65]

Generally, the report finds that behavioral science research programs of the Federal government are fragmented and under utilized.

At the apex of the executive branch of government, the Office of Science and Technology in the Executive Office of the President is judged to be short of sufficient competence in behavioral science areas. Furthermore, the report concludes that leading government administrators do not uniformly appreciate the potential contribution of behavioral sciences. One cause of this failure is found to be in the insufficient incorporation of a social science perspective in the fields of business, law, and certain other fields which are proportionately well represented in the ranks of government administration.[66] On the other hand, the educational preparation of behavioral scientists themselves is also questioned. Training is commonly oriented toward teaching or research in academic settings and not toward policy formulation. A capability to act in a "translator" capacity must be developed if the behavioral scientist is to bring his discipline to bear most effectively on social policy questions. University training of behavioral scientists is judged too often neglectful of the development of that capacity.[67] The report identifies the strong tendency in government to favor applied research closely related to agency missions, but it strongly urges that this tendency not be allowed to constrain a very necessary substantial quantum of basic research.[68]

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[64] "Camelot" was a military-funded American social research project in Chile studying the factors associated with revolutionary insurgency. The expulsion of the project from that country and the revelation that it was conducted from a university in the U.S. received widespread publicity.

[65] The Behavioral Sciences and the Federal Government, National Academy of Sciences, Washington, D.C., 1968, pp. 3-4, 34, 42.

[66] Ibid., p. 42.

The report recommends the government's present economic and statistical systems as useful models for the future incorporation of behavioral sciences in government planning. It recommends that new social science positions be opened in the Federal administration and that provisions should be made for inservice training and advanced study opportunities for behavioral science personnel in government.[69]

The report further recommends that each Federal agency should specially plan the long-range role of behavioral science research. It recommends that the behavioral science competence of the Office of Science and Technology should be developed; a separate National Social Science Foundation, a separate office of social science in the Executive Office of the President, and a separate presidential assistant for social science are all rejected as unwise approaches. The report stresses the interrelation of all sciences and their collective relation to government policy questions. The behavioral sciences, in short, must be coordinated closely with general science policy. In the same vein, the President's Science Advisory Committee should be expanded so that the membership reflects an appropriate balance of behavioral and social scientists.[70]

The report recommends that the National Science Foundation should have primary responsibility for Federal support of the development of the behavioral sciences. Special centers should be established for this purpose and institutional and departmental grants should be made for the strengthening of the behavioral and social sciences.[71]

Finally, the President and the Congress are urged to create an independently endowed National Institute for Advanced Research and Public Policy "to undertake continuing and long-range analyses of national policies and problems, to serve as a center for continuing interchange between government policy makers and scientists, and to provide a forum in the Nation's capital for the full exploration of the growth and application of knowledge from all the sciences to the major issues of the society."[72]

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[67] Ibid., p. 46.

[68] Ibid., p. 51.

[69] Ibid., pp. 3-5.

[70] Ibid., pp. 9-12.

[71] Ibid., p. 14.

The Behavioral and Social Sciences Survey

A broad survey of behavioral and social science policy which is nearing completion and will necessarily have some impact on educational R&D policy has been conducted under the joint auspices of the National Academy of Sciences-National Research Council and the Social Science Research Council. Responsibility for planning and executing the study has rested in the hands of a central planning committee chaired by Ernest R. Hilgard with Henry Riecken serving as Vice Chairman.

The survey was undertaken in response to widespread and increased interest in the behavioral and social sciences on the part of government agencies, the Congress, and others connected with national science policy. The purpose of the survey is to provide a basis for an informed and effective national policy for strengthening and developing the behavioral and social science fields.

The survey will cover all the disciplines embraced under the rubric of behavioral and social sciences, including anthropology, economics, history, political science, psychology, sociology, fields, and also geography, linguistics, psychiatry, statistics, and communications and management sciences. Applications of the behavioral and social sciences and their utilization in professional schools, industry, and government will also be examined.

The survey will review recent developments in the several sciences involved and will indicate how, given the present state of state of available knowledge these sciences might best be used for dealing with social problems.

Data will be presented to assess the size of the present behavioral and social science enterprise and to offer projections of growth for the immediate future. Attention will be paid to manpower in teaching and research, to the recruitment and training of graduate students, to the financing of research and teaching, and to the growing demands for equipment, facilities, and space. The survey will also attempt to evaluate trends in basic and applied research that are especially promising and those which may inhibit appropriate utilization of behavioral and social knowledge. It is expected the study will appear in November, 1969.[73]

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[72] *Ibid.*, pp. 15-16.

[73] The citation for the volume when it appears will be *The Behavioral and Social Sciences: Outlook and Needs* (Englewood, N.J.: Prentice-Hall, 1969).

Report of the Special Commission on the Social Sciences

One final general study which will have bearing on educational research and development policy has been sponsored by the Special Commission on the Social Sciences of the National Science Board (NSB). Prepared by Orville B. Brim of the Russell Sage Foundation, the report is scheduled to appear momentarily.[74]

The National Science Board, in the face of legislative pressures for some activity in the social sciences (in particular the proposed legislation for a National Social Science Foundation) and the effective application of the social sciences to major social problems, established a special commission to examine the state of the social sciences with a particular view to implementation.

The report will come out with recommendations for the establishment of a series of research institutes whose principal objective will be finding solutions to social problems. Their aim will be to make recommendations and to actually assist agencies in the development of legislation and programs. The report will recommend that the National Science Foundation should begin the institutes immediately looking forward to perhaps 25 institutes with an average funding level of $2 million each.

Summary and Conclusions

A considerable range of surveys, studies, and reviews of educational research and the behavioral and social sciences having direct and indirect bearing on the subject of this report has been summarized here. Some central threads can be discerned and some tentative conclusions bearing on this outpouring of activity can be drawn.

Regarding educational research, several consistent judgments and conclusions emerge across the reviews and evaluations. The need to adopt a more forthright posture regarding the support of basic science relating to education is present, balanced by the equally strongly stated need to focus educational research, and particularly development, on the solution of high priority educational problems.

The latter, especially, requires much more explicit delineation and specification of R&D objectives. A third continuing concern is aimed at the present quality of the entire research and development enterprise in education. Calls for closer ties to the parent disciplines and the involvement of more individuals of high repute from the social and behavioral sciences emerge with regularity.

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[74] The citation for the report when it appears will be Orville B. Brim, Knowledge Into Action: Improving the Nation's Use of the Social Sciences, NSB-3, 1969.

A fourth continuing thread can be found in the judgment that educational research and development is clearly under-supported financially and in great need of more forceful, and more directed, manpower development policies. Also, the importance of the relationship of research programs to the research and education communities finds expression in the concerns evinced over review and planning procedures, advisory mechanisms, the politics of research, and "vertical and horizontal" integration.

Finally, some tentative conclusions can be drawn relative to the outpouring of review efforts and status studies in the behavioral and social sciences. On the negative side it might be well to be reminded of the old adage that "a watched pot never boils." Certainly, from the perspective of performers of educational research and development who have in the past two years been spending large amounts of their time preparing for formal and informal site visit reviews, the time is probably upon us for doing rather than observing.

On the positive side, it is clear that much is expected of educational research in particular and the behavioral and social sciences in general. The reviews have all been undertaken with an eye to improvement, rather than possible discontinuance. They have been oriented to elevating standards and heightening impact, to fulfilling the sense of promise that is increasingly shared among policy-makers looking to the application of the behavioral and social sciences to education.

Chapter XI

POLICY IMPLICATIONS FROM R&D OUTCOMES: A SPECULATIVE ANALYSIS

Research and development ultimately affect educational policy. Of course there are studies which have immediate and direct bearing on educational policy. Evaluation studies, statistical projections, indeed, all the activities which come under the general heading of policy research obviously are designed to have an impact on the educational decision-maker.

In the larger sense, however, research and development ultimately affects educational policy because it creates new knowledge. The new knowledge alters both the fundamental understandings of the nature of learning and education and the technical, professional capabilities for carrying out instruction and achieving educational goals. Whenever new understandings or new capabilities are discovered or produced, new kinds of policy issues and responsibilities arise.

No analysis of research and development for education could be considered complete, then, without some attention, even though only speculative and illustrative, to the potential policy impact of recent research. This chapter explores four of the many potential areas of impact. Each is examined within the same general framework. For each -- early learning, individual differences, professional role of the teacher, and non-instructional variables affecting achievement -- examples of the relevant research are presented. Present understandings in each area are then projected forward in the form of illustrations of potential applications to instruction and education. Finally, presuming the validity of the projections, the potential policy implications are explored.

Early Learning

A substantial amount of work over the years has been done exploring the characteristics and conditions for cognitive development. To name just a few of the leaders, researchers like J. Piaget, R. Sears, B. Bernstein, J. McV. Hunt, J. Kagan, and A. Gesell have been studying and reporting on various aspects of cognitive growth and human development. Five years ago Benjamin S. Bloom reviewed hundreds of longitudinal studies of human growth and development in his slim but powerful volume, Stability and Change in Human Characteristics.[1] These longitudinal studies, examined as a whole, reveal the critical importance of the early years for cognitive growth. They suggest that the great plasticity in human characteristics during this time could, if properly worked with, lead to significant alterations in existing norms and patterns of distribution of human capabilities in the future.

The research suggests the critical role of early stimulation in intellectual development. A clear shift is taking place in the views of the child as a recipient organism; increasing interest is being shown in the competence of infants to solve problems and to interact with their environments.

Early conceptions of child development saw growth following a fixed genetic pattern and pace in a closed system; as long as there were no physical or nutritional obstructions the child would mature according to a pre-set pattern. The evidence now seems to indicate instead that growth and development are processes of dynamic interaction between the individual's genetic endowment and his environmental circumstances, psychosocial as well as physical and biological. Appropriately timed encounters between the child and events and objects in his environment are seen as crucial to each stage of development and to the emergence of each behavior and skill. Environmental conditions including social, visual, auditory, and tactile stimuli are drawing increasing attention by researchers. The effects of nutrition on cognitive development both before and after birth are also receiving growing emphasis.

Of the secondary characteristics associated with environmental factors, continuity, that is, the importance of smoothness and integration in programs aimed at facilitating cognitive growth, emerges with increasing clarity. That the home environment appears to be the place where continuity of learning can be most effectively sustained during the period of maximum growth, suggests the preeminence of parental influences on early cognitive growth. Parental influence is important for verbal development, but its effects can also be perceived on emotional growth and achievement motivation.

Researchers have discovered that many homes lack essential variables favorable to optimal development. The discovery of the importance of these variables and their apparent absence in many home environments has helped to focus attention on early childhood as a research area of high priority. Two practical questions arise. Can home environments be improved and, if so, how? Should alternative environments to the home be developed for early childhood and made available on demand?

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[1] Benjamin S. Bloom, Stability and Change in Human Characteristics. New York: John Wiley & Sons, Inc., 1964.

The discovery of the importance of early problem solving behavior and visual, auditory, or tactile stimulation to cognitive growth has sparked the development of the parent-child toy-lending library. Support for this has come from the Far West Laboratory for Educational Research and Development with USOE, Educational Facilities Laboratory, and Carnegie Corporation. The purpose of the library is to make available toys, games, puzzles and other learning materials designed to develop the child's senses, language skills, and problem-solving abilities. A model for installation in any part of the Nation, the library contains materials for use at home or in pre-school and kindergarten situations. Displayed within reach of a small child, each toy is accompanied by two or three pages of illustrated instructions for the parent or teacher.

Another approach to the enhancement of development of cognitive abilities in the existing home environment is the Children's Television Workshop. The Workshop is developing programming, to be beamed to homes, parent-child centers, nursery schools, and the like. The programs will engage children in activities calculated to stimulate cognitive development. The financial investment in the work is high; to assure that the programming will be competitive with commercial efforts every effort was made to secure the very best talent for designing and developing the dramatic, cultural, animation, and instructional sequences.

A third way of impacting on home environments might be the development of instructional programs designed to acquaint parents or parents-to-be with the importance of the early years. Parent-child centers are now attempting to do this, but curriculum development efforts might also be mounted to produce materials and techniques that help secondary school students learn before school-leaving age about the critical importance of nutritional and environmental variables in cognitive growth.

Powerful interventions can be devised to operate outside the home environment or perhaps even in the place of it. Research and development underway now will ultimately lead to the creation of the tools necessary to develop full-blown, institutionalized approaches to early childhood learning. "Optimal development" will be defined; curricula aimed at achieving it will be designed and validated. When they are, the possibility of establishing comprehensive programs (at public or private expense) that foster the careful and systematic development of cognitive and other skills in children will finally be presented to parents, communities, and the Nation.

Presuming the future existence of these new programs and techniques, new policy issues will confront the educational policy-maker, be he professional, parent or politician. The first such issues to arise will relate to decisions that must be made in response to the development of specific innovations for early childhood learning such as the toy-lending library and the Children's Television Workshop. In fact, some of these issues are shortly to come up for decision. Should the toy-lending library be made available in every community? Should the 26 weeks of programming being developed be publicly subsidized on commercial television? Should such programs take priority over other activities or programs for which the monies might also be spent? Or, perhaps more neutrally, where does supporting such specific capabilities fit in the larger scale of educational priorities?

Suppose a secondary curriculum program is developed which successfully conveys an understanding to all young people of the importance of early childhood for later development and success in life. Should this curriculum supplant other material now occupying significant blocks of time in the secondary experience, and if so, which? How much effort by contrast should be directed to reaching those who are not enrolled in formal instructional programs but are already parents or who are about to become parents.

Increasing the scale of the policy commitment, presume the successful development and validation of full-scale institutionalized programs for early childhood. Should such programs be implemented nationwide? If so, what are the attendant implications for training professional staff, providing facilities, administrative support, equipment and supplies, and so on? Should all children be included in such a nationwide program or just certain children?

Consider the serious problems of the educational goals to which such programs should be directed. Should deliberate attempts be made to provide for pluralistic goals? On what grounds might the programs developed be adapted to the particular requirements dictated by varying cultural backgrounds and parental or community desires?

Secondary policy consequences -- in the tradition of Jacques Ellul who has suggested that the secondary and tertiary consequences of innovation were often far more important than the immediate outcome -- bear careful examination, too. What will be the impact of successful early childhood programs on the content and practice of elementary and secondary education? Also consider the degree to which the aspirations of young people affected are likely to change in regard to extending their education beyond the secondary level. Consider the impact on the society as a whole. For example, to what degree and in what manner might patterns of employment and occupational structure change if early childhood programs fulfill their promise and alter present distributions of talent and capability (as presently measured) in the population at large? Or, phrase the speculation in a negative frame. What are the social, economic, and political consequences of developing such capabilities for enhancing early cognitive growth and then ignoring the apparently great opportunities for enhancing human capabilities by not providing sufficiently enriching environments to stimulate early learning in all individuals? The potential for social strife or at least disaffection are real; the consequences stemming from aroused public understanding of the existence of unused capabilities are not being lost on educational policy-makers these days.

Individual Differences

Anatomical, physiological, and biological differences characterize all individuals; pyschological individuality, of course, is of greatest importance for education. No matter how "homogeneous" a grouping one can find in a classroom, everyone knows that each person there will react in a unique way to whatever situation might be presented to them all.

The description and study of individual differences is no mean accomplishment. Past decades have witnessed considerable debate over whether any classification system or systems can be validly applied. At least three systems for imposing structure upon human diversity have been devised. The first constructs typologies and sorts individuals accordingly. The second approach sorts people into natural groups such as sex, age, or race. The third approach empirically identifies separate traits, works out means for measuring those traits, and then applies those means to individuals.

The principal traits or dimensions of analysis for individual differences include mental abilities, achievement, motivational factors, aptitudes, and cognitive styles. Increasing recognition of the significance of these variables to educational success has engendered serious challenges to traditional instructional techniques. If all these variables are in fact present in the learning situation, how secure can we be with the traditional teacher-centered classroom approach to instruction?

In response to these concerns, considerable activity has been aimed at redesigning instructional programs and techniques to tailor them to individual needs and requirements. There are a number of different types of activities under the generic heading of individualizing instruction.

Individually Prescribed Instruction, (IPI) begun by the Learning Research and Development Center at the University of Pittsburgh and carried forward in its later developmental stages by Research for Better Schools (the regional educational laboratory based in Philadelphia) is an individually-tailored instructional program in reading, mathematics, and science. Under this program teachers serve as diagnosticians and prescribers of instructional materials. Their role is not to lecture to groups of youngsters, but rather to use basic data about each student to develop a specific learning prescription.

Another example of individualized instruction of a quite different sort is the self-instructional material for high school students being developed by the Northwest Regional Educational Laboratory. A student first reads the instructions in his course guide. He then watches an instructional film or a filmstrip-tape presentation on an easy-to-use cartridge projector. The film periodically stops to allow the student to answer a question or respond. The student practices the skill he is learning. At various points the student compares his work to that of professionally produced models or takes tests to determine his success in mastering the skill.

Individualization utilizing the computer can be accomplished in at least two ways, computer assisted instruction and computer managed instruction.

Computer assisted instruction (CAI) is a way of presenting carefully programmed instructional sequences to students in a manner which is responsive to learner behavior both in time and substance. The capacity for immediate response is reinforcing to the learner and the branching capability of the computer, depending on student input, insures the presentation of program sequences to the learner which are individually suited to his responses. CAI makes full use of (1) the virtually instantaneous capacity of the computer to respond to learner input, (2) the branching capability in curriculum programming, (3) the multi-media capability represented by audio-video-print modes of response, and (4) the power of the computer to keep detailed records offering a learning environment directly responsive to individual learners.

Computer managed instruction (CMI) directly aids the instructor rather than the learner. Detailed data on instructional units are stored in a memory unit. Information regarding individual units of curriculum representing perhaps many different media are retrieved in response to data which the instructor submits regarding individual student interest or performance profiles. The information the computer gives back in response to an instructor's query constitutes alternative curricular prescriptions that the teacher might wish to use with a learner. This mode of computer usage extends the range of options individual teachers can bring to bear in learning situations and thereby increases the opportunity for meeting individual student needs and requirements.

The policy issues which will arise from success in developing technologies for individualizing instruction are manifold. One of the most serious questions is how such technologies are to be diffused throughout a system currently organized on the basis of assumptions quite at variance with concepts of individualization. The educational system in the United States can be characterized as "flat," meaning that in order to produce quantitatively significant alterations in instructional practice in the system as a whole virtually all of the professionals have to be reached individually. In other words, even assuming that mechanisms exist (e.g., research and development institutions and programs) for initiating innovations in the direction of individualization, the absence of any sustaining mechanisms for technological changes as fundamental as these would be represents a serious policy problem in its own right. (Some of the mechanisms would be: training officers in all schools, regular on-the-job programs for professional renewal, program development staffs in all school districts.)

Certain of the new technologies, such as CAI, need not necessarily be installed or utilized within the existing structure of schooling as we know it. Educational computer utilities have been proposed which could make certain kinds of instruction available to young children before they formally enroll in school. Each child might be entitled to use a certain number of hours on the computer each year (records, of course, being kept by the computer). Installation of computer learning stations in stores, markets, apartments, or store-front centers could make it possible for four- and five-year olds to become readers and typers before they enter school. The cost and organizational implications of this possiblity are intriguing and need careful examination.

Other policy implications of success in individualizing instruction seem even more provocative. School systems can become vacation-independent. Teachers will not need to worry about "processing" entire classes any longer, for individualized instructional programs will make it possible to serve any child who comes to a school at any time that he appears. Diagnostic pre-tests will reveal the child's present learning and achievement status, and appropriate learning prescriptions can then be applied.

A set of questions of considerable, perhaps over-riding, importance concerns the objectives of individualized instruction programs. If learning-effective curricula or instructional techniques can be developed through careful attention to individualization, who will choose which objectives are sought by individual students? For what kinds of objectives will mastery be the goal for all students? For what kinds of objectives will students (or parents) be free to make their own choices? At what point should educators assume instructional programs have done their job? Or, at what point do educators judge that learning should become more individual, and therefore more pluralistic, in the sense of being accomplished more by independent study?

Professional Role

Research bearing on the professional roles of educators focuses on such areas as teacher effectiveness, teacher role, and teaching methods. The variables involved in analysis include teacher traits existing prior to the actual teaching situation, such as attitude, "warmth," personality traits, subject matter competence, and completion or noncompletion of certification requirements.

Studies of teacher performance include all those attempts to explore and analyze overt teaching behaviors. The difficulty of data collection has presented serious obstacles to research in this field. Teacher behaviors have been studied in terms of their verbal content, in terms of the manner in which the verbal content is delivered, or in terms of relatively stable behavior patterns which teachers exhibit in classroom situations. These approaches tend to abstract the teacher's performance out of the classroom context and deal with it as a subject of direct investigation.

A second approach to analyzing teacher role has been to examine the character and quality of the teacher-pupil interaction. Teacher behavior is seen as imbedded in interactive frameworks. Codes are worked out for analyzing the joint (teacher-pupil) characteristics of the behavior sequences. Different models which have guided research here have been based on language, learning, decision-making, or combinations of all three.

A third approach has examined teacher behavior as one feature of the classroom conceived as an integrated social system. Again, different models of the social system have been used to guide study and analysis. These include communication models, ecological structures, activity structures, and end-state or product models.

Some of the findings of this research indicate the extremely rapid pace of classroom exchange, the "ringmaster" character of classrooms with teachers occupying center stage, and the high degree to which students in classrooms are bored and find themselves in what Flanders calls "an affectional desert."

Research on teaching methods focuses on techniques which are (1) recurrent in teacher behavior, (2) applicable to various subject matters, (3) characteristic of more than one teacher, and (4) relevant to learning. Four major categories of teaching methods have been identified. "Classroom discourse," an eclectic combination of short lectures, questioning, recitation, free discussion, and opportunity for discovery, is by far the most common method of instruction. Three other, more discrete, approaches include the lecture, discussion, and discovery methods. Distinctions have also been made between didactic and heuristic methods of instruction.

The implications of the research on teaching role and method for educational practice are sweeping, especially as they relate to recently acquired knowledge of individual differences. The realization that much of what teachers have traditionally done in the classroom bears little relation to student learning processes has stimulated considerable discussion about new teacher roles, particularly, for example, those suggested in various proposals for differentiated staffing arrangements. The more careful delineation of instructional roles, classroom management procedures, social interaction processes, and productive professional behavior can easily lead to radically different ways of structuring roles and responsibilities in school settings.

Research on teacher effectiveness has revealed other interesting findings. For example, evidence exists that teachers as a group do not begin to affect student achievement significantly until they have had four or five years of actual teaching experience. The implication that teachers are developed in the crucible of real experience rather than in teacher education programs of limited duration -- and some might say quality -- points to some very hard thinking about present patterns of teacher preparation. Not surprisingly, differentiated staffing begins to look attractive on this count because it offers the possibility of so designing the role levels that interns, apprentices, beginning teachers, and the like can experience gradual induction into the profession under the helpful eyes of their more experienced colleagues. This, of course, implies that schools ought to bear principal responsibility for the training of teachers, and colleges and universities principal responsibility for their education. The policy consequences of that conclusion hardly need elaboration.

Significant alterations in either the conception of teacher role or the programs designed to prepare people for those new roles seem likely to encounter much the same difficulty identified in diffusing individualized instructional programs across the Nation. Vested interests of one kind or another are bound to view with understandable suspicion (or at best with some jaundice) complete reformulations of approach. But, perhaps even more serious, American schools and universities do not possess the mechanisms required to sustain changes as fundamental as those which seem to be required.

A second major policy implication grows out of the likely and necessary effect of differentiated staffing arrangements on remuneration schedules. Differentiated staffing means varying orders of responsibility. It almost requires breaking out of degree- and time-based salary schedules. But this requirement is almost sure to intersect at some point with the direction that professional organizations seem now to be taking, and when it does, it is likely to liven up the issues surrounding possible diffusion of the new arrangements throughout the educational system.

Finally, the implications of new professional and sub-professional roles in education raise questions regarding present practices of teacher certification. While there have often been opportunities to pass over certification regulations for experimental purposes, altering them fundamentally and permanently has proven a difficult task. Thus, the manner in which such regulations are adopted will need to be examined at the policy level with a great deal of care and sensitivity.

Non-Instructional Variables

Finally, a significant body of research focuses on the effect of non-instructional variables on educational attainment. "Non-instructional" is a catch-all word; it can mean peer influence, socio-economic variables, political structures, cultural variables, and the like.

Studies showing the predictive power of socio-economic variables on school achievement are well known, but in many instances, of course, the variables mentioned are only intervening or correlational. No one really believes, for example, that level of parental income directly influences student achievement. But the correlation is present, as it is with other measures such as occupational status, level of education, and so on.

Similarly, the effect of peer variables on student achievement has been indicated in the Equal Educational Opportunity Survey in Coleman's earlier work, The Adolescent Society, and in C. Wayne Gordon's The Social System of the High School. Composition of classes and the reinforcing effect of peer influence have significant bearing on student outcomes.

Increasing attention is being paid to the larger organizational dimensions of American education. State responsibilities for education, the size and composition of local districts, and the patterns of local political control of education are undergoing study and, at least as far as the daily press would reveal, are increasingly the objects of intensified political pressures and turmoil. Attempts to decentralize the administration and political control of education are being studied. So are different organizational approaches such as educational parks or super-schools bringing together large numbers of children. The purpose here would be to alter existing patterns of student mix or to make it more economically feasible to bring to bear specialist professional services of different kinds.

Manifest dissatisfaction with present school curricula at several levels of education, in terms of the discrepancy between the apparent objectives of those curricula and student, social, and manpower objectives, has led here and there to research studies. From these studies have come proposals for somewhat more radical approaches to education; these may involve non-school models, at least for significant portions of secondary and higher education, or even proposals for new patterns of supporting education to stimulate competition among schools.

The educational implications of these various kinds of studies support, for example, more effective use of peer variables to increase student achievement. The use of students as teachers or tutors is one positive suggestion that emerges from a careful consideration of the power of peer influence. Explicit attempts to manipulate pupil composition as a means of enhancing student attainment can be found in the radical desegregation program of the Berkeley school system in California and in the study and design of educational parks in New York City; East Orange, New Jersey; and Pittsburgh, Pennsylvania, to name just a few.

Of somewhat larger scope, in that it goes beyond schools, is the renewed interest in apprenticeship, internship, or work-study arrangements. In part these ideas grow out of a recognition of the impact of non-school variables on student motivation and performance. But, in addition, rapid changes in society and technology have made it especially difficult for school curricula to keep pace with the real world. Possibilities for using the real world as the raw material or laboratory of instruction have increasingly caught the interest of educators. Robert Bickner, for example, has suggested that after certain minimal competencies are developed, real activities in the service, manufacturing, and business worlds might form the backbone of the learning environment for young people of all kinds.[2]

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[2] Robert Bickner, "After the Future, What?" Institute of Government and Public Affairs, University of California, Los Angeles, December, 1965, mimeographed.

Deliberate alteration of the pupil composition of schools in order to secure optimal distributions of racial, social, or economic factors is laden with controversy. On the other hand, the attempt to do so goes straight to the heart of the goals and purposes of education in a free society, one of the central tenets of which is equality of opportunity.

The possible use of students as tutors or indeed teachers may run afoul of child labor laws. It may also be viewed dimly by those who will see such suggestions as exploitative and unwarranted incursions on available time for learning. Careful definition of when and under what circumstances such arrangements might be acceptable needs to be developed.

Finally, the notion that real experiences themselves might become the principal raw material for learning after certain fundamental learnings are mastered needs to be examined in the light of growing affluence and the existing structures of society, business, government, and manufacturing at large. If the futurists are correct that modern society will fulfill itself as it becomes a learning society, perhaps the educational policy issues become indistinguishable from broader cultural, technological, and political questions which confront us. For example, how can industry, government, business, and the professions become more nearly self-renewing? What can the larger society itself contribute as an instrument for learning and human growth?

Summary

The four examples presented here are illustrative. They have been analyzed speculatively and without any attempt to avoid being provocative. The point was to illustrate one of the most exciting features of educational research and development, namely, the capacity that it has to alter the very grounds, assumptions, and value presuppositions upon which learning, education, and indeed society are based.

The examples developed above provide illustrations of some recurring concerns likely to emerge as a consequence of the successful support of educational research and development. One of the most important is the likely conflict that will emerge as new knowledge and technical capabilities appear to threaten established values and ways of doing things. The hypothesized knowledge, for example, that institutionalized early learning environments are more effective than many kinds of home environments, will force decisions (without prejudicing which direction the decision will go) that have never before confronted our society.

A second major problem, particularly in respect to major innovations such as differentiated staffing or individualized instruction, arises because it would appear that at present we do not possess the kinds of administrative and professional mechanisms required to cultivate and sustain radical research-based reformulations of instruction and education.

A third continuing thread is found in the concern over the relationship between high-level technological development in the social and behavioral sciences and the deliberate cultivation of diversity and pluralism. Problems of curricular choice and professional, political, and parental control of education are likely to be raised in new and perhaps difficult ways as a consequence of the creation of instructional technologies that do effectively produce the student outcomes intended from them. As science increases our capacity to predict and control the outcomes of instruction, our present trust in (what now seem to be) random events to produce the kinds of human diversity on which society thrives may no longer be warranted. Special attention to this kind of problem will become more important as knowledge about instruction and education advances.

Chapter XII

CONCLUSIONS AND ISSUES

The preceding chapters of this report have laid out a detailed picture of educational research and development in the United States. Conceptual structures have been explored and a background description of American education presented. A brief history of educational research in the United States preceded descriptions of the sponsors, performers, and management of educational research and development. The financial and manpower resources available were reviewed. An analysis of work supported in Fiscal Year 1968 was developed. Recent reviews of educational research and development, or larger studies that would have bearing on the subject, were summarized. In the last chapter, the potential impact of research and development in education was speculatively addressed. From this considerable base it is possible to generate a few fundamental, far-reaching conclusions.

The Absence of an Overall Strategy

Probably the most all-embracing conclusion that can be drawn from the data is that no overall strategy currently governs the support and growth of educational research and development in the United States. Strategy as used here refers to an overall design, mapped out in advance with a set of consistent and well-defined goals and objectives, and a matching set of procedures or methods either identified or capable of being identified to attain those ends.

The preceding chapters provide ample evidence of the absence of such an overall design. First, no sponsoring or performing agency during the course of the study identified such a strategy, and indeed, when the issue was broached, most denied that such a strategy existed. A simple examination of (1) the almost bewildering variety of management procedures being employed by the sponsoring agencies, (2) the diffusion of responsibility for educational research and development even within the United States Office of Education which is responsible for the bulk of that currently being supported, and (3) the considerable array of different types of institutions, instrumentalities, and performing agencies provides additional substantiating evidence.

This conclusion does not refer to individual programs or agencies which might be examined. On the contrary, there are a number of programs, notably the Course Content Improvement Program of the National Science Foundation, the National Program of Educational Laboratories, and ERIC, which have, within the parameters of their particular responsibilities, very carefully mapped out strategies and are systematically pursuing them. All that is being said here -- but it is critically important -- is that no overall strategy exists which links, or provides for the linkage, of the many different kinds of individual efforts which are currently being supported in the field of educational research and development.

Inadequate Financial Support

Whether or not an overall strategy exists, is desirable, or is being sought, there is ample evidence that the financial resources available for educational research and development are woefully inadequate. Consider the testimony of Francis Chase in his review of the National Program of Educational Laboratories or the analysis of the Research and Policy Committee of the Committee for Economic Development in their policy report, Innovation in Education. Examine the cost of individual education development projects relative to the total resources now available. Compare the total resources currently being allocated to educational research and development relative to the total national expenditures on education in the Nation. Consider the almost unlimited number of potential research and development activities that might be undertaken. Together all these elements provide convincing evidence that the financial resources currently available for educational research and development represent the most modest of beginning investments.

A "what-might-be" analysis prepared in the fall of 1968 by USOE's Bureau of Research is provocative in this regard. Bureau officials developed what they felt was a conservative estimate of the continuing need for support of educational development work alone. Using existing organizational categorizations for education, Bureau officials estimated at 20 the number of school years for which the Bureau of Research has development responsibilities. The estimate was based on two pre-school years, 12 elementary-secondary years, two post-secondary years in vocational and technical areas, and four undergraduate years at the college level. The Bureau estimated that a reasonable number of full-year curriculums which might be developed for each of those 20 school years would be ten (e.g., ten subject matter fields for grade 11, etc.). On this estimate the total number of full-year curriculums, stated as units, for which the Bureau of Research could be responsible would be 200. If, furthermore, the Bureau were to pursue as policy the development of alternative approaches to each unit to permit and indeed enhance local and State options in course selection, the total number of potential curriculum units competing for support can be calculated at 600. In addition to the development of learning-effective materials within the existing structure of schooling and education (what industry would call defensive research and development) it might also be deemed desirable to develop alternative approaches to existing instructional arrangements and school organization (offensive research and development). This additional effort, equivalent to perhaps 200 curriculum units, would be directed to what can be termed radical departures from existing instructional practice.

The potential "field" for educational development at any given point in time, therefore, might approximate 800 units of development work designed to produce learning materials for one full year's instructional use in a given curricular area. Estimates now increasingly more firmly based on hard data suggest an average cost for the development of such a curriculum unit of approximately $4 million. If the time span for a development unit is approximately 7 years from the time of conception of the idea to the completion and release of the materials to the school systems of the Nation, then it is possible to conclude (800 course units times $4 million divided by 7 years) that the average investment which might reasonably be directed to educational development each year approaches $460 million. (Note two things about this analysis: it includes no resources for fundamental research, dissemination, demonstration, or manpower development activities; and even this sum amounts to less than eight-tenths of one percent of the estimated total expenditure on education in the United States in either 1968 or 1969.)

In summary, the analysis of potential demand for educational development together with comparisons between education and other fields of relative support for R&D underscore the extremely small resources currently available to finance educational R&D.

The Manpower Shortage

A third major conclusion which can be drawn is that manpower supplies are barely adequate to carry out the range of activities currently being supported in educational R&D (although in certain areas and for certain types of functions manpower exists which is currently not being tapped). The currently existing manpower development programs for educational R&D personnel appear to display insufficient scope for the range of roles required, and in any case to be far too small in terms of the number of trained personnel being turned out.

Francis Chase's findings regarding the difficulties the laboratories encountered securing trained personnel to carry out the functions for which they were responsible, and the importance he attached to the development of inservice training programs for laboratory and center staffs, provide additional evidence of the manpower shortage.

Data Inadequacies

Despite the fact that the present study contains more quantitative data than has ever been presented before in a review on educational research and development, it is apparent there is much still to be done. Some of the concerns raised in Chapter VIII are directly relevant here. The incompleteness of available estimates of financial support for educational research and development from all sources and the present lack of detail and specificity in analyses of trained manpower for this field also speak to this point.

Part of this difficulty can be traced to problems of conception and definition. For example, the several reviews of educational R&D, while illustrating considerable agreement in overall thrust, clearly illustrate variance in the use of such terms as research, inquiry, and development. The difficulty of assessing State and local education agency activities for this study grew in some measure from the absence of agreed-upon distinctions between research, development, experimentation, demonstration, and evaluation.

A second instance of this problem can be found in the attempt to develop a substantive analysis of educational R&D and related activities supported in Fiscal Year 1968. More thinking needs to be done relative to the taxonomies to describe educational R&D.

Even granting the reservations regarding the preliminary analysis of research and development activities presented in Chapter VIII, it is nonetheless becoming possible to address questions directed to the overall allocation of research and development resources.

For example, the actual distribution of R&D resources can now be analyzed in terms of age-grade level, or target group, or performing institution, or educational topical area. These analyses can, in turn, be studied in terms of independent judgments directed to the state of the art in research or development for any given category in any given dimension. Finally, both allocations and estimates of the state of the art can be evaluated in terms of the priorities gleaned from assessments of social and educational problems confronting schools and the Nation. While this chapter is not the place to engage in such analysis, certainly the finding that it is now increasingly possible to do so is worthy of mention, and the fact that it has not yet been done must be counted among the still existing data inadequacies.

Finally, a third aspect of this problem is the absence of any continuing institutional capability or mechanism for the systematic collection of information about educational research and development. The HEW review of the Bureau of Research, the report of the Committee for Economic Development, and the difficulties encountered in the development of this entire study point to the need for doing something about this problem.

The Central Issue

All the material developed in this report focuses on three questions:

> Can science provide the basis for the improvement of instruction in education?

> Should the use of science to improve education constitute a high priority policy determination?

On the assumption that both of those questions are answered affirmatively, then a third question can be posed.

> What are the elements that must be considered in developing an overall strategy for the support of research and development for education?

The problems and issues, which must be thoroughly examined before anything approaching an overall strategy for educational research and development can be created, can be approached from three different perspectives. Each of the perspectives described below is not wholly separate from the others; each, however, suggests a different way of organizing the issues; each, in part, raises certain questions which are not wholly relevant to the other two perspectives; all together raise the entire range of issues requisite to the development of a comprehensive strategy.

The first perspective comes from consideration of what might be called R&D policy strategy. This perspective would tend to focus on questions such as the long-term goal for the relationship of R&D to education, the financial and manpower dimensions, and the development of institutional capabilities for research and development. It is a perspective that performers of research and development would be especially likely to contribute to the discussion.

The second perspective comes from consideration of educational policy strategies for R&D and would focus on substantive priority determinations within educational R&D. It would stress the importance of developing effective decision-making procedures which would attend to (1) the planning and analytical requirements for priority, goal, and objective setting, (2) the multiple jurisdictions over education in the Nation, and (3) the special requirements and contributions of the science and technology communities to educational R&D. This perspective is one through which sponsors of research and educational policy-makers are most likely to make their contribution.

Finally, the third perspective focuses on what might be called change process strategies. From this point of view will be raised a series of questions about (1) the manner in which scientific knowledge does or can affect instruction and educational practices, (2) the role, significance, and bases for educational "engineering" or educational technology, and (3) the full range of diffusion concerns. It is a perspective which will be added to the debate by scholars of diffusion and change processes.

R&D Policy

The fundamental concerns here are the basic assumptions behind the R&D program as a whole and the goal that has been established for the relationship of research and development to education.

Basic assumptions are important. For example, consider the difference between assuming that research might ultimately improve education and assuming that it can. Quite different consequences flow from those alternatives in terms of management effort, program level, and centrality of priority.

Definition of goal is similarly critical. For example, the goal could be to maximize the return on the existing level of investment in educational research and development. Or, it could be to expand the resource allocation to R&D at the maximum feasible rate until the level of support reaches a point at which an "optimum relationship" to the operating educational system is achieved. This might be phrased in terms of building an R&D supporting function for the operating educational system analogous to the scientific enterprise which now supports the practice of medicine in the United States.

If a decision to engage in a major planned expansion of the research effort were to be made, then a number of careful analyses must be conducted. Estimates must be made of what levels of support would sustain such an optimum relationship. Currently existing institutional capabilities must be measured against future requirements. Analyses of manpower and training program requirements must be completed to insure the orderly development of supplies of trained personnel. All of these studies must then be translated in terms of a time frame which projects a reasonable progression of training programs, increased funding, and the development of institutional capabilities.

Educational Policy

A second perspective on the development of an overall strategy for educational research and development grows out of the need for priority determinations and decision-making. Many of the conceptions developed in the opening section of Chapter VI are directly relevant here. Responsibility for operating educational programs rests in many agencies and many levels of government, and, quite naturally, it is primarily in all those places where educational needs are observed and defined. On the other hand, the science base which stands in potential support of education is also extremely broad and diverse. Means must be devised for bringing these two quite different communities together to devise a meaningful, high potential research and development program.

While the development of an overall strategy for educational research and development priorities does not necessarily mean that one or another agency supercedes all others with respect to financing and management, it does imply detailed data collection from the science and education communities, considerable amounts of coordination between and among sponsoring and performing agencies, and the location somewhere of a sophisticated analytical capability directed to the entire field.

Attention must be paid under this heading to the proper utilization of scientific, technical, and professional education personnel in the establishment of R&D priorities, in decision-making on R&D programs and projects, and in monitoring and overview of ongoing activities.

The determination of priority areas in which to work is an important political and generalist task. The choice of specific research and development goals and then some specific objectives to serve those goals is the place for cooperative efforts by generalists, professionals, scientists, and technicians. Unfortunately, in education as in any social field, the dimensions of analysis are numerous and the categories within them even more so. Sub-optimizing in more than three dimensions is simply too difficult at present in the social and domestic sphere. It is therefore probably necessary to engage in program development by going through a series of inductive/deductive sequences. This is preferable to going through any exhaustive process of evaluating all the R&D possibilities in a given analytical category and then inductively arriving at choice; there is neither time nor manpower to investigate such an incredibly broad universe of potential activities. Some way of short-cutting the process must be found, but it must adequately meet the needs and requirements of the several groups who have important stakes in either doing or utilizing research and development. A cycle of induction to arrive at program priorities, deduction to develop R&D goals, and then induction to devise reasonable research and development objectives needs to be invented and pursued with some tenacity.

Some, not many perhaps, but some analytical tools for planning R&D programs are beginning to emerge for education. While agreement on priority areas would be a major step forward in itself by providing focus for program development efforts, the refinement of the categories in analytical dimensions such as research function, age-grade level, target group, and input categories peculiar to education (e.g., professional role, curriculum, instructional system, school organization, etc.) is beginning to result in heuristics which will help to insure thoroughness and will provide the planner with shorthand devices for suggesting what kinds of educational professionals and scientists and technicians ought to be participating in the planning processes.

Change Process

Under this heading can be grouped a number of questions having to do with the way in which science can improve or affect educational practice, and the manner in which educational "engineering" or technology provides bridging mechanisms between the discovery of new knowledge and its application in operating educational programs. Also included under this heading is the consideration of the effect of our developing understanding of change processes in the educational system on the ways in which we support educational research and development and what is required once it is done to diffuse the resulting innovations throughout the educational system.

Strategies for the support of basic science which have the potential for impact on instruction, learning, and education will probably seem very similar to such strategies in other fields. Where they may differ is in the disciplines supported. Important judgments need to be made here. The central disciplines of psychology and sociology are obvious choices. So, too, are economics, anthropology, and political science. But work in linguistics, statistics, philosophy, history, and other fields may also bear a promise of relevance; they, too, must be carefully assessed to establish levels and mechanisms of support consistent with their potential contribution relative to the other, more central, disciplines.

Our evolving understanding of the nature of several kinds of educational development or engineering suggests that it may not always be exactly analogous to development in other fields of endeavor. For example, development in education may look in some cases like technological development and in other cases like economic development. In any case, careful exploration of the function of development for education, its cost, and the conditions necessary for its successful performance would be a very central part of strategic considerations under this heading.

Finally, careful study and exploration of the nature of change processes in the educational system should provide important data relevant to the tactics to be employed. For example, the understanding of the importance of sustaining mechanisms for educational innovation as well as initiating mechanisms (i.e., the research and development itself) may guide the actual support of R&D in the first place. Similarly, the significance of accreditation and credentialing procedures may bear heavily on the tactics employed in installing newly developed techniques and materials.

Careful study of the reward structures in education may offer clues to the process of innovation; the organization or structure of instruction itself may have to change before substantial research-based improvements can be installed. Finally, the absence of agreed-upon performance standards or clearly understood output expectations may mean that criteria essential to evaluation are absent and that no referents therefore exist upon which the effort to seek and install new procedures and practices can be based. Many more dimensions of change process could be adduced here; the point is that they have direct bearing on the ways in which research and development is supported and the likelihood of its having significant impact.

Prognosis

Recent events suggest that the prognosis is good for beginning the kinds of thinking required to rationalize all the various elements in the educational research effort in the United States. Of course, this report constitutes something of a beginning in its own right, but more important is Assistant Secretary James Allen's avowed intention to strengthen the research activities of the Office of Education. Through a combination of the planning, evaluation, statistical and research responsibilities of the Office of Education under one overall director, the Assistant Secretary hopes to strengthen the relationship of these activities to policy issues of high priority.

In the interim, the assumption by the Department of Health, Education, and Welfare, the parent body of the Office of Education, of responsibility for structuring the planning activities for research suggests their view of the importance of these activities.

The months and years immediately ahead can be fruitful ones for educational research and, therefore, for education. Much hard thinking needs to be done; communication links need to be forged; and important messages need to be transmitted and received to set the pace. American education confronts more than one crossroad; the cost of not having the knowledge and techniques to secure the desired choices will be difficult to bear. The promise of educational research to generate the improvements that are required is too great not to begin immediately improving its support, management, and impact.

APPENDIXES

Approved by RAC
1/25/69

Appendix A

FUNCTIONS OF THE RESEARCH ADVISORY COUNCIL

The Research Advisory Council is a 15-member body, advisory to the U.S. Commissioner of Education and the Associate Commissioner for Research on the research programs of the Office of Education. Its functions include the following:

(1) Policy Review

The Research Advisory Council advises the Commissioner and his staff on the goals and priorities for the research programs and on policies that guide those programs.

(2) Program Review

The Council periodically reviews, discusses, and advises the Commissioner and the Associate Commissioner for Research on the continuing programs and plans of the Bureau of Research. The Council is expected to direct its attention to identifying the strengths and weaknesses of the program and to make recommendations for beneficial changes in emphasis and design.

(3) Review Procedures

The Council periodically discusses and advises the Commissioner and the Associate Commissioner for Research on the procedures by which the Bureau of Research plans, administers, and evaluates its programs. These procedures include techniques for planning, for administrative control, for processing proposals (including reviewing, contracting, and monitoring of proposals and projects), and for evaluating the effectiveness of research programs.

(4) Review of Budget Requests, Proposed Allocations of Funds, and Actual Allocations

As part of its advisory oversight of OE's research programs the Council reviews periodically the requested levels of support for research activities and the allocation of these requests (and appropriations) to different parts of the USOE research program. Such reviews take place regularly at sessions scheduled to dovetail with the budgeting and appropriation process.

(5) Other Responsibilities

The Research Advisory Council also considers other items of business pertaining to research programs of the Office as required by the Commissioner, Associate Commissioner for Research, and the Council itself.

Procedures

The RAC functions on the basis of agendas submitted to them ten days in advance of regularly scheduled meetings. The agendas include all necessary supporting material. Items are placed on the agenda by the Commissioner for Research, and the Council. Items may be added to the agenda at the time of the meeting only with the concurrence of the Council.

APPENDIX B

INTERVIEWEES FOR R&D POLICY STUDY

Non-Federal Institutions Where Interviews Were Conducted In Preparation For This Report, and Name of Respondent (Through January 27, 1969)

Institution	Name and Title of Respondent
A. Research and Development Centers, and other OE Sponsored Centers	
1. R&D Centers	
Learning R&D Center University of Pittsburgh	J. Steele Gow, Exec. Dir. J.L. Yaeger, Assoc. Dir.
Center for the Advanced Study of Educational Administration University of Oregon	Dr. Max G. Abbott, Director
Wisconsin Center for R&D for Cognitive Learning University of Wisconsin	Dr. Herbert J. Klausmeier, Director James P. Walter, Dissemination Section Dir.
R&D Center in Educational Stimulation University of Georgia	Dr. Warren G. Findley, Co-Director
R&D Center in Teacher Education University of Texas	Dr. Oliver H. Brown, Co-Director
Stanford Center for R&D in Teaching Stanford University	Bruce Harlow, Coordinator of Publications, Dissemination and Media Unit
Center for R&D in Higher Education University of California, Berkeley	Dr. Leland L. Medsker, Director
Center for the Study of the Evaluation of Instructional Programs University of California, Los Angeles	Dr. Marvin Alkin, Co-Director Dr. Merlin C. Wittrock, Co-Director

APPENDIX

Institution	Name and Title of Respondent
A. Research and Development Centers and other OE Sponsored Centers (cont'd)	
2. Educational Policy Research Centers	
Educational Policy Research Center Stanford Research Institute Menlo Park, California	Dr. Robert Daw, Assistant Director
Educational Policy Research Center Syracuse University	Dr. Thomas Green, Director
3. Early Childhood Lab	
National Lab on Early Childhood University of Illinois	Dr. James O. Miller, Director
4. Vocational Education Centers	
The Center for Research and Leadership Development in Vocational and Technical Education Ohio State University	Dr. Robert E. Taylor, Director
Center for Research, Development and Training in Occupational Education North Carolina State University	Dr. John K. Coster, Director
B. Regional Educational Laboratories	
Center for Urban Education New York, New York	Dr. Robert Dentler, Director
Eastern Regional Institute for Education Syracuse, New York	Dr. Sidney Archer, Director
The Far West Laboratory for Educational Research and Development Berkeley	Fred Rosenau, Coordinator of External Relations

APPENDIX

Institution	Name and Title of Respondent
B. Regional Educational Laboratories (cont'd)	
Education Development Center Newton, Massachusetts	Dr. Kevin Smith, Acting President
Research for Better Schools, Inc. Philadelphia	Dr. James M. Becker, Exec. Director Dr. Margaret Jones, Program Coordinator
Northwest Regional Educational Laboratory Portland, Oregon	Dr. John Sandberg, Deputy Director
Regional Educational Laboratory for the Carolinas and Virginia Durham, North Carolina	Dr. Everett Hopkins, President
Southwest Educational Development Laboratory Austin, Texas	Dr. Edwin Hindsman, Exec. Director Preston C. Kronsky, Staff Member
Upper Midwest Regional Educational Laboratory Minneapolis	Dr. David Evans, Exec. Director Dr. Marvin F. Daley, Deputy Director for Programs
C. Universities	
Teachers College Columbia University	Dr. John H. Fischer, President
School of Education Stanford University	Dean H. Thomas James
Graduate School of Education Harvard University	Dean Theodore Sizer Dr. Richard Rowe, Assoc. Dean for Admin.

APPENDIX

Institution	Name and Title of Respondent
C. Universities (cont'd)	
School of Education University of California, Berkeley	Dr. James Jarrett, Associate Dean
Graduate School of Education UCLA, Malibu	Dean John I. Goodlad Dr. Carolyn Stern, Staff Member
School of Education University of Wisconsin	Dean Donald J. McCarthy Dr. Stewart North , Coordinator ERIC/CEF
College of Education University of Illinois	Dean Rupert N. Evans
Oregon College of Education	Dr. James Beaird, Assoc. Dir., Teaching Research
College of Education University of Michigan	Dean Willard Olsen
College of Education Wayne State University	Dr. J.W. Child, Asst. Dean of Students
School of Education University of Indiana	Dr. Henry M. Brickell, Assoc. Dean for R&D
College of Education University of Minnesota	Dr. Jack Merwin , Associate Dean
Graduate School of Education University of Chicago	Dean Roald F. Campbell
School of Education University of Pittsburgh	Dr. Morris Cogan, Chairman Dept. of Teacher Education Paul E. Watson, Assoc. Dir. International Studies Center

APPENDIX

Institution	Name and Title of Respondent
C. Universities (cont'd)	
College of Education University of Georgia	Dean Joseph Williams Dr. Stanley Aimsworth, Assoc. Dean for Research and Graduate Studies
College of Education University of Texas	Dean Wayne Holtzman
D. State Education Departments	
North Carolina Department of Public Instruction	Dr. Vester Mulholland, Dir., Research Division
Georgia State Dept. of Education	Mr. William Schadacker, Director of Research Unit
Minnesota State Dept. of Education	Mr. Walter Harvey, Director of Research W.W. Keenan, Administrator, Minn. National Lab. Section
Massachusetts State Dept. of Education	Dr. James Baker, Director of Research
New York State Dept. of Education	Dr. Lorne Woollatt, Assoc. Commissioner for Research and Evaluation
Pennsylvania State Dept. of Education	Dr. Robert B. Hayes, Director of Research
New Jersey State Dept. of Education	Dr. Stan Salett, Asst. Commissioner W. Phillips, Jr. Dir., Office of Research

APPENDIX

Institution	Name and Title of Respondent
D. State Education Departments (cont'd)	
Texas State Dept. of Education	Dr. Jerry Barton, Director of Research
California State Dept. of Education	Dr. Melvin Gipe, Director of Research
E. Foundations	
Ford Foundation New York, New York	Champion Ward
Carnegie Foundation of New York New York, New York	Alden Dunham
Russell Sage Foundation New York, New York	David Goslin
Sloan Foundation New York, New York	Arthur Singer
Rockefeller Foundation New York, New York	Leland DeVinney
Kellogg Foundation Battle Creek, Michigan	Russell G. Mawby
Kettering Foundation Dayton, Ohio	Samuel G. Sava

APPENDIX

Federal Institutions Where Interviews Were Conducted In Preparation For This Report, and Name of Respondent (Through January 27, 1969)

Department of Health, Education, and Welfare

Alice Rivlin
Assistant Secretary for Program Planning and Evaluation

Jack Biren, Special Assistant
Program Analysis - Education
Office of the Assistant Secretary for
Planning and Evaluation

Office of Education

Norman J. Boyan
Associate Commissioner for Research
Bureau of Research

Joseph Froomkin, Assistant Commissioner
Office of Program Planning and Evaluation

Hendrik D. Gideonse, Director
Program Planning and Evaluation Staff
Bureau of Research

Glen C. Boerrigter, Director
Division of Elementary-Secondary Education Research
Bureau of Research

David S. Bushnell, Director
Division of Comprehensive and Vocational Education
Research
Bureau of Research

Howard Hjelm, Director
Division of Educational Laboratories
Bureau of Research

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Department of Health, Education and Welfare

Office of Education (cont'd)

Richard McCann, Director, Laboratories Branch
Division of Educational Laboratories
Bureau of Research

Ward Mason, Chief, R&D Centers Branch
Division of Educational Laboratories
Bureau of Research

Andrew Molnar, Research Associate
Division of Higher Education Research
Bureau of Research

Ralph J. Becker, Director
Division of Plans and Supplementary Centers
Bureau of Elementary and Secondary Education

James Moss, Director
Division of Research
Bureau of Education for the Handicapped

National Institute of Child Health and Human Development

Mae Rosenberg, Program Analyst
Program Planning and Evaluation

National Institute of Mental Health

Betty Pickett, Deputy Director
Division of Extramural Research Programs

Richard Louttit, Chief
Behavioral Sciences Research Branch
Division of Extramural Research Programs

APPENDIX

National Science Foundation

Lawrence Binder, Program Director
Course Content Improvement Program
Division of Pre-College Education in Science

Alfred Borg, Program Director
Science Curriculum Improvement Program
Division of Under-Graduate Education in Science

Office of Economic Opportunity

Mary Robinson, Research Sociologist
Research and Plans Division
Office of Research, Plans, and Evaluation

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